CITY OF
VICTORVILLE

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March 21, 2007

RECEIVED
APR 12 2007

Mr. Chris Hoidal
Director, Western Region
Pipeline and Hazardous Materials Safety Administration
12300 W. Dakota Ave, Suite 110
Lakewood, CO 80228

SENT TO COMPLIANCE REGISTRY
Hardcopy ✓ Electronically ___
# of Copies 3 / Date 4/13/07

RE: Notice of Amendment CPF 5-2007-0007M

Dear Mr. Hoidal:

We have received the Notice of Amendment in reference.

Based on the inadequacies found during the Pipeline and Hazardous Materials Safety Administration (PHMSA) inspection, please find our response listed below with the corrections we have made to such inadequacies:

1. §191.5 Telephonic notice of certain incidents
   Our correction is in our "Natural Gas Emergency Response Plan", section F: Reporting Requirements, part F.1, paragraph B.
2. §191.9 Distribution System: Incident Report
   Our correction is in our "Natural Gas Emergency Response Plan", section F: Reporting Requirements, part F.1, paragraph C.
3. § 192.513 Test requirements for plastic pipelines
   Our correction is in our "Natural Gas Operations & Maintenance Manual", section H: Testing, part 3.1-C.

Enclosed with this letter you will find a copy of our Natural Gas Emergency Response Plan as well as our Natural Gas Operations & Maintenance Manual for your reference.

Sincerely,

Wayne Campbell
Victorville Municipal Utility Manager

cc. Hossein Monfared

Attachments

SENT TO COMPLIANCE REGISTRY

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Municipal Utility Services # of Copies 3 / Date 4/13/07

Page No: ***1 of 1***
Issue Date:
Superseded Date:

MANUAL REVISION RECORD

Revisions Record System Beginning Date ________/Enter Revision Date Upon Receipt
*If you have missed receiving **ANY** revision number, contact* ___________________

Revision		Section	Revision Changes
No.	Date		
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Emergency Response Plan
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EMERGENCY RESPONSE PLAN
GENERAL

A.0 SCOPE

This Emergency Plan is a requirement of the Code of Federal Regulations (CFR), Title 49, Part 192.615. It shall be the responsibility of Wayne Campbell/Utilities Manager, Accountable Individual for the City of Victorville Natural Gas Utility / Operator to review and exercise this plan annually and update this Emergency Plan as may be necessary.

The Operator commits to maintain a safe gas system. The safety of employees and of the public is of major concern along with maintaining the reliability of gas service. When an emergency arises that could affect the normal, safe distribution of gas to customers, it is essential that a predetermined course of action, and the means necessary to accomplish this action, be taken immediately. All actions shall be directed toward protecting life, property and the environment. All employees of the Operator shall be subject to call for assistance in maintaining public safety, restoring service or correcting unusual conditions involving the natural gas system. Emergency telephone or radio messages shall be given first priority by all employees.

This Emergency Plan will be used for the training and qualifying of personnel prior to the occurrence of an emergency. In actual emergencies, the responding personnel will be required to exercise individual judgment, and to take the appropriate actions considering all apparent circumstances.

A.1 DEFINITIONS

Emergency An emergency is an unforeseen combination of circumstances or the resulting state that requires immediate action by the Operator and its personnel to protect life, property and the environment. The following are some examples of emergencies requiring prompt and effective response include, but shall not be limited:

- The uncontrolled escape of natural gas
- Gas detected inside or near a building
- Fire located near or directly involving a pipeline facility
- Explosion occurring near or directly involving a pipeline facility
- Employee Injury
- Natural disaster; flood, tornado, earthquake, etc.
- Act of war, sabotage or terrorism
- System Over-pressure
- Gas outage

Incident: An incident involves an uncontrolled release of gas from a pipeline

Employee: For the purpose of this Plan, employee means an individual employed by the Operator and who performs operations, maintenance, or emergency-response function regulated by Part 192. This may represent a contract employees working on behalf of the Operator.

"Dispatcher"; The employee(s) on duty for the Operator who receives and records incoming notification of conditions which require response by the Operator, and who dispatches Operator personnel to meet those requirements.

Incident Commander: The incident commander is normally the Fire Department officer in overall command and control of on scene operations for the incident, or may be the gas supervisor in charge if fire and/or police are not present at the incident.

Supervisor-in-Charge: The Operator's supervisor who is most knowledgeable in the details of a major incident and/or who has primary responsibility for the field response to a natural gas emergency shall be in command of the operator's involvement in an incident involving natural gas and shall be responsible for verifying accountability of responding personnel during an incident. Dispatch shall maintain a list of all personnel responding to the incident and note any differences between those called to the incident and those responding. Results and especially any discrepancies shall be reported immediately to the Supervisor-in-Charge.

"Condition One" - if condition one emergency is declared, radio silence shall be observed except as required to respond and assist in emergencies.

Under Control: Under control represents the time at which the emergency nature of the situation has been resolved and that normal Utility communications may be resumed. This term is also reflective of the time at which the uncontrolled escape of natural has ceased/shut-off.

A.2 INFORMING AND TRAINING PERSONNEL

As part of our continuing education program, all Operator emergency response personnel and others as appropriate (Fire, Police, Public Information, etc.) shall receive training annually covering the response to natural gas emergencies. The training shall be designed to acquaint the individuals with the emergency procedures and how to promptly and effectively handle gas emergency situations. The program may be implemented by oral instruction, written instruction, and in some instances, group instruction followed by practical exercises.

Those responsible for instruction of employees shall place special emphasis on prompt and effective response including:

- Understanding the properties and behavior of natural gas and/ or other gasses, as related to types of potential hazard.
- Coordinated execution of the Operator's written emergency procedures.
- Ability to use gas system maps and other facility records.
- Knowledge of how emergency control is exercised in various sections of the system (including identification and operations of key gas valves).
- Responsibilities of each employee responding to an emergency and his relationship to the emergency response plan.
- Evaluation of reports of gas odor and other potential emergencies.
- Response to different types of emergency situations.
- Action directed toward protecting life, property, and the environment.
- Familiarization with equipment and tools appropriate to the particular function or situation.
- Completion of the record keeping requirements and the need for after action review of an emergency situation. This should include a log of the emergency failure investigation, and the validation and documentation of the corrective actions taken.

The training shall be conducted annually with provisions for integrating emergency plan revisions as necessary. Records shall be maintained to document the annual training for each employee. The records shall contain training dates, instructor's name(s), course outline, names of employee, outside agencies and others as appropriate, in attendance.

A.3 LIAISON WITH APPROPRIATE LOCAL CIVIL AUTHORITIES

It shall be the responsibility of Operator to establish and maintain a liaison between fire, police, civil defense officials, and with others as appropriate that may become involved in an emergency response involving natural gas or a natural gas incident. Liaison shall be conducted annually. The purpose of this liaison is to:

- Establish procedures to facilitate prompt and effective communication and response during an emergency,
- Familiarize persons responsible for public safety with the characteristics of gas and precautionary measures to be taken.
- Establish mutual agreed upon means for the control of emergency situations involving natural gas.
- Participate in fire, police and civil defense Emergency Planning meetings, both on local and state levels.
- Familiarize personnel of the responsibility and resources of each organization that may respond to a gas pipeline emergency.

A.4 NEWS MEDIA COMMUNICATION--DISSEMINATION OF INFORMATION

The Utilities Manager or his designee is responsible for providing information pertaining to natural gas emergencies. After reaching general agreement with the Incident Commander, this individual will prepare required press releases, schedule news conferences and coordinate the dissemination of information with the appropriate Operator personnel prior to its release.

Field Personnel: Operator and/or contractor personnel who are approached by the media shall indicate the Operator desires to be cooperative, but should refer them to the appropriate management or designated personnel or ask them to await the arrival of the appropriate individual.

It may be appropriate to indicate that, "The emergency or incident is being attended to and remains under investigation at this time."

Management Personnel: Appropriate management personnel as designated by the Operator shall handle all media enquiries. When news media coverage appears probable, the appropriate Operator spokesperson shall be notified. All information to be released shall be approved by appropriate management personnel.

Operator personnel in charge of the emergency may provide on-site information directly to news media personnel when the designated spokesperson is not available at the scene. Inform appropriate management of the information, which should include the names of the reporter, the name of the news agency and an overview of the information released.

A.5 EMERGENCY COMMUNICATIONS

In any emergency event, consideration should be given to emergency communications including availability and security. Telephone landlines and cellular telephone service may be interrupted or damaged. Two-way radio may be the best available communications.

Emergency communications shall be analyzed in advance to determine special communications requirements between the dispatch and on-site operations, and between the dispatch and the local authorities that may be involved. Arrangements shall be made for availability of these additional facilities and equipment if and when deemed necessary. In the event of a major emergency, a "Condition One" may be declared to ensure open communications for appropriate emergency response.

During an emergency or natural gas incident, a log of all significant events and of corrective actions taken in restoring normal operations shall be maintained. It shall be the responsibility of the individual in charge of the emergency to see that this log is satisfactorily accomplished.

A.6 IMPLEMENTATION OF THIS EMERGENCY PLAN

This plan shall be initiated as necessary to control and make safe any actual or potential threat to life, property and the environment. This may include activation of an emergency work force and appropriate emergency vehicles, material and equipment necessary for the particular situation. Decide if additional assistance is needed and request it through appropriate channels. Give consideration to situations where one emergency may cause or be concurrent with another.

GAS LEAK OR LINE BREAK

A Grade 1 leak / line break involving the gas distribution system must be given immediate attention to insure the safety of customers, the general public, and their property. A secondary, but important, consideration is to prevent the loss of gas service to the system or to a portion of the system, and to minimize the period of time that gas service is not available.

Personnel who may be assigned duties in such situations shall be thoroughly trained in the actions required in the Emergency Response Guidelines.

Determine if there are leaks in the gas distribution system. Prepare a sketch showing property lines, buildings, streets and alleys, gas piping, meter location, sewer manholes and vents, appliance locations, bar test patterns, and test results.

FIRE OR EXPLOSION

The first consideration in responding to a report of an explosion or of a fire that may involve natural gas is the safety of customers, the general public and their property. Actions must be directed at protecting life first, then property and the environment. It is also important to determine the cause of the incident. If natural gas cannot be ruled out as a possible source, obtain a gas odorant check as soon as possible.

Personnel who may be required to respond to a report of a fire or explosion shall be thoroughly trained in the Emergency Plan Guidelines. The Incident Commander will direct overall emergency activities at the scene of a fire or explosion.

Notify the appropriate management personnel of any explosion at the earliest practical time. An engineer or insurance adjuster may be assigned to investigate the incident, and will direct further investigative action as necessary, working in close cooperation with Operator personnel.

A.7 SYSTEMS MAPS

In the event of an emergency that requires shutting off the gas supply to a section of the distribution system, it is important that system information be available to enable this to be promptly and effectively accomplished. Current system maps shall be updated and available in the Operators office(s) and each Operator construction vehicle to permit rapid determination of the location of control valves and gas control fittings that may be utilized for such shut-down.

A.8 EMERGENCY VEHICLE, MATERIAL AND EQUIPMENT

It is essential that emergency vehicles, materials and equipment be predetermined and be readily available in the event of an emergency. The appropriate supervisor shall insure that materials and equipment necessary to respond to an emergency be available for dispatching to the scene of an emergency within the shortest practical period of time.

All operator emergency response vehicles should be equipped with the following:
- Cell phone and / or 2-way radio
- 1st aid kit
- Hard hat(s)
- Traffic safety vest(s)
- Glove(s)
- Safety Goggles
- Dry chemical fire extinguisher (10 lb.)
- Flashlight
- Shovel
- Hand tools
- Leak detection soap
- Cloth rags
- Manometer and / or ounces gauge
- Traffic safety cones
- Grounding clamp
- Ear Protection

EMERGENCY RESPONSE PLAN
GENERAL

The operator's shall make readily available the following additional items for emergency response:

- Dry chemical fire extinguisher (20 lb and/or greater)
- Emergency repair clamps 1" – 2"
- Squeezers PE 1" – 8" (2)
- Pipe locator
- Stock cock changer
- Fusion equipment 1" – 2"
- Grounding clamps (2)
- Probe bar
- CGI unit
- Brass hammer
- Valve wrenches 12" – 36"
- Traffic cones (reflector) (2)
- No smoking signs (2)
- Self Contained Breathing Air (1)
- Fire protective Coveralls (2)
- Harness and safety line
- Flame ionization unit
- Combustible gas indicator
- Monoxer
- Test gauges - 15 psi
  60 psi
  200 psi

- Fusion equipment 4"
- PE squeezers 4"
- Emergency repair clamps 4"
- Mueller tapping/plugging equipment E-4, D-4 and C1-36
- Air compressor
- Light stands
- Excavation Equipment
- Jack hammer
- Breathing air (2 bottles)
- Masks (2)
- Additional hand tools
- 4 KV portable generator

B.O SCOPE

This section establishes the guidelines and procedures to be followed by Operator personnel receiving initial notification and in responding to operator emergencies.

Reports of emergencies or potential emergencies that affect or could affect the normal, safe distribution of gas shall be received by, or immediately directed to, a person knowledgeable and qualified in reacting to such situations. **Note: Any report of a gas leak or a complaint of gas odor or fumes shall be treated as an emergency. Leak calls shall take precedence over all other assignments.** Such reports may come from a variety of sources depending on the emergency; including employees, customers, the public, police, fire department, public safety agencies or civil defense. In certain categories of emergencies, specific instructions for reacting to the initial report are required and are detailed in this Emergency Plan. When reports of situations that could seriously affect gas distribution operations are received, attempt to obtain and record, as much information as possible including:

- The date and time of the report.
- The name, address and telephone number of the person making the report. If this person is reporting in behalf of a civil authority, also record this information.
- The location or affected areas of the emergency.
- The nature and severity of the emergency.
- **Document all information utilizing appropriate Forms**

Refer to O&M Plan Manual for specific procedures and field tasks

The guidelines in this ERP Section B are general in nature and its primary use will be for the training of personnel prior to emergencies. During an actual emergency, the personnel responding to the emergency will be required to exercise their individual judgment to take the appropriate actions considering all apparent circumstances.

B.1 CARBON MONOXIDE

- Request he following information:
  - Type of Building?
  - Do you have a CO detector?
  - If so, did the alarm sound?
  - Has anyone in the building displayed symptoms of Carbon Monoxide (CO) poisoning?
    - Headaches
    - Irritated eyes
    - Tiredness or sleepiness
    - Frequent yawns
    - Nausea
    - Unexplained dizziness
    - Unexplained vision problems
    - Hard to focus attention
- Has anyone recently had the flu or flu-like symptoms?
- Does the caller suspect CO coming from a specific appliance?
- Have any plumbers, contractors, or other persons checked or worked on any appliances recently?

IF caller indicates that CO is strong, advise all occupants to leave the building as soon as possible

Dispatch Qualified Utility Personnel, if the CO is suspected. (Refer to O&M Section H-9, CO Testing)

Document all information utilizing appropriate Forms

Determine if assistance is required from outside emergency responders.

B.2 FIRE/EXPLOSION

- Assume that all calls are valid and could be extreme emergencies. Take the time to ensure that all questions have been answered. If the emergency is judged to be extreme: immediately contact appropriate field personnel and other emergency responders (Fire, Police, etc.). Notify appropriate management personnel.
- Request the following information:
  - Name

- Address
- Telephone Number
- Location of incident (if different)
- Is anyone injured?
- Type of building (commercial/residential)
- Is natural gas involved
- Location
  <u>Inside</u>
  - Any recent remodeling?

  <u>Outside</u>
  - Meter set?
  - Near the building?
- Extent of injuries, if any

- Advise the caller:
  - For escaping gas inside, evacuate occupants and move to a safe location.
  - For escaping gas outside, keep people a safe distance away from the leak.
  - A utility representative will respond
  - Ask the caller if someone will be there
  - If not, arrange for someone to meet our personnel at the site.

Immediately Dispatch Qualified Utility Personnel. (Refer to O&M Section J-9, Leakage Investigation)

Monitor the response of field personnel; Assist with communications: Notify the Supervisor-in-Charge:

Document all information utilizing appropriate Forms

Determine if situation is a Reportable Incident

B.3 <u>DIG-IN / LINE BREAK</u>

- Assume hat all calls are an emergency. **Immediately** dispatch a **Utility Service Person and other** appropriate field personnel.
- Request the following information:
  - Name
  - Address
  - Telephone Number
  - Is anyone injured?

  - Record time of call
  - Is gas blowing?
  - What type and size of line?
  - Main
  - Service
  - Service Stub
  - Name of responsible party?
- Advise the caller to:
  - Caution against sources of ignition.
  - Keep people well away from the hit line.
  - Do not attempt to shut off unless on customer side of meter.
  - Arrange for someone to meet our personnel at the site.

Dispatch Qualified Utility Personnel. (Refer to O&M Section J-9, Leakage Investigation)

Assist with communications as necessary to support individuals responding to the emergency.

Document all information utilizing appropriate Forms

Determine if situation is a Reportable Incident

B.4 GAS LEAK CALL

- Assume that all calls are an emergency. Dispatch appropriate field response personnel. Gas leak calls shall take priority over other types of calls.
- Request the following information from the caller:
  - Name
  - Address
  - Telephone Number
  - Type of building (commercial/residential)
  - Severity of odor
  - Location of odor
    Inside?
    - What area of the building?
    - Near a specific gas appliance?
    - Has appliance been moved or worked on recently?
    - How long has the odor been present?

Outside?
- Meter set?
- Near the building?
- Has there been any recent excavation in the area?
- Length of time the odor has been noticed?

- Advise the caller, if the leak is judged to be extreme, of the following precautions:
  - Caution against ignition **(don't hang up phone).**
  - Do not operate electric appliances
  - Do not turn on/off lights
  - Do not operate vehicles or equipment
  - Do not smoke
  - Inside gas leak; evacuate and move to a safe location.
  - Outside gas leak; keep people well away from the leak.
- Explain to the caller that:
  - Our personnel will respond.
  - Access to the building is necessary
  - Arrange for someone to meet our personnel at the site
  - Inform the caller that should no one be available at the time the service person arrives he will lock the meter off

Dispatch Qualified Utility Personnel. (Refer to O&M Section J-9, Leakage Investigation)

Monitor the response of Field Personnel and assist with communications

Document all information utilizing appropriate Forms

Determine if situation is a Reportable Incident

B.5 NO GAS/LOW PRESSURE

- Assume that all calls may be an emergency.
- Request the following information from the caller:
  - Name
  - Address
  - Telephone Number
- Explain to the caller that:
  - A Utility Representative will respond.

- If contact between the caller and Utility Department is appropriate, arrange for someone to meet our personnel.

Dispatch Qualified Utility Personnel

Notify Gas Superintendent or Designee

Monitor the response of Field Personnel; Assist with communications as necessary to support crews responding to the emergency

More than one call within close proximity may be indication of a more widespread problem

Document all information utilizing appropriate Forms
Determine if situation is a Reportable Incident

B.6 GAS OUTAGE - GUIDELINE

An outage call shall be considered an emergency and a priority. Employees, under the direction of the Gas Supervisor or Designee, shall take the actions outlined below.

The Gas Superintendent or the Designee shall be responsible for controlling the outage restoration immediately when notified of a gas outage of significant magnitude. He shall initiate the following action:

- Determine the boundaries of the outage and the number of meters involved.
- Determine manpower requirements.
- **Dispatch Qualified Personnel** to turn off gas service valves at each service in the affected area
- Advise manager of situation
- Advise dispatch of situation
- Advise appropriate civil authorities of the emergency when necessary.
- Assign additional personnel to answer calls at the directory-listing emergency telephone number. (Appendix A)
- Direct the person assigned general work supervision responsibilities to implement the turn-off procedure

Refer to Section J-9, Leakage Investigation

Document all information utilizing appropriate Forms

Determine if situation is a Reportable Incident

B.7 CIVIL DISORDER OR NATURAL DISASTER

In the event of civil disorder or natural disaster (such as flood, tornado, or earthquake), action shall be taken to enable priority gas distribution operations to be carried on. This action must provide for the security of the public and Operator employees and property in such circumstances. Such an action plan, necessarily broad in nature, is detailed in this guideline.

Work Provisions

Civil authorities during a civil disorder or natural disaster are expected to direct overall emergency activity in affected areas. In the event of enemy attack, the Civil Defense Headquarters will provide directions. It is vital that the Operator maintain continuous and effective liaison and Communications with these authorities, utilizing the Operator personnel assigned liaison duties to the fullest possible extent.

Provisions shall be made for continuous (24 hours per day) operations during an emergency. At least one responsible employee shall be on duty at all times.

A central operating headquarters should be designated to coordinate operations involving the emergency. Its location should, whenever practical, be as close as possible to the location of the work forces assigned duties during the emergency. Consideration should be given to the need for one or more alternate operating headquarters in the event the principle headquarters is untenable.

No employee shall be given an assignment in a dangerous or potentially dangerous area unless adequate protection can be assured. Operator personnel entering such areas must be easily identifiable as Operator personnel. They should be provided with hard hats having the Operator logo affixed. All Operator vehicles entering the area should readily identifiable.

Persons assigned to the emergency work force shall perform their emergency duties and responsibilities as directed.

The supervisor in charge of a work group may grant permission to designated employees to take Operator vehicles to their homes, where they will receive work assignments by telephone or radio rather than the normal practice of reporting to the office.

Security forces from outside should be utilized to protect Operator facilities if the situation warrants.

Security of Facilities and Equipment

The Operators gate stations and/or district regulator stations are vital to providing gas distribution service to customers and thus must be provided special monitoring services or protections to insure their continuous operation. A list of stations requiring special services or protection shall be developed at the time the extent of the emergency is known.

Maintain vehicles and mobile equipment in a fully fueled, operational condition within protected Operator property. In certain situations, civil authorities may limit the sale of fuel at public service stations; therefore, prior arrangements must be made for fueling all Operator vehicles and equipment at a Operator facility or, through civil authorities, arrangements must be made for obtaining fuel at outside locations.

Manpower Requirements

The composition of the work force required to deal with a situation covered by this guideline will depend upon the nature and extent of the emergency.

Communications Capability

In the event of emergencies covered by this guideline, the capability to communicate orders, instructions and information to Operator personnel is vital. Equally important is the capability to communicate with civil authorities that will be directing operations in the affected areas. Communication between the emergency work group assembled to coordinate operations and assigned personnel should be accomplished using the normal telephone system, including cellular phones whenever possible. Operator radio facilities may also be utilized for this purpose.

Receiving Reports of Emergencies

Upon receipt of a report of a civil disorder, natural disaster or enemy attack, attempt to obtain and record as appropriate the following information:

- The date and time of the report.
- The name, address and telephone number of the person making the report. If this person is reporting in behalf of a civil authority, also record this information.

- The location or affected areas of the emergency.
- The nature and severity of the emergency.
- Determine the location of the emergency operations center and personnel in charge.
- Determine if any Operator action is immediately necessary and if so, determine if the affected area is under Police protection.

Forward this information to the person assigned overall responsibility for Operator operations during the emergency as shown in Appendix A. This individual shall assure that adequate provisions are made for receiving calls during the period from initial notifications until the emergency work group is assembled; these calls shall be promptly relayed to a designated person.

Once the emergency work group is in operation, the dispatcher and other persons who might receive calls during the emergency shall be notified. All information collected regarding the situation shall be relayed to the group at this time. Future calls from civil authorities should be relayed to the emergency work group.

EMERGENCY RESPONSE PLAN
EMERGENCY RESPONSE

C.0 SCOPE

When the dispatcher is notified of a gas emergency he/she shall immediately dispatch a service person or other qualified individuals to investigate. Immediately upon arriving at the scene of an emergency, the first employee shall assess the situation and then take actions directed toward protecting life, property and the environment.

C.1 CONTROLLING EMERGENCY SITUATIONS

The operator's first responder shall assess the situation and consideration shall be given to the following actions:

- **Securing the area**
- **Evacuating premises which are or may be affected**
- **Shutting off the gas**
- **Eliminating sources of ignition**
- **Blocking off an area**
- **Rerouting traffic**
- **Preventing incidental ignition**
- **Ventilating the affected premises**
- **Controlling the flow of leaking gas, by closing valves or by other means**
- **Determining the full extent of the hazardous area including the extent of the gas migration and secondary risk**

As soon as practical after arriving on the scene, the operator employee shall report to the dispatcher the field situation and request fire and/or police or other assistance as necessary. If upon investigation the service person determines that the situation can be made safe without assistance, he shall do so.

If the emergency involves fire, property damage, injury and/or death to a human being, the dispatcher shall insure that the fire and police departments are notified. Immediately thereafter, the Gas Supervisor the Designee shall be notified. The Gas Supervisor or the Designee shall instruct the dispatcher to implement appropriate sections of the Emergency Plan. The Gas Supervisor or Designee, shall be responsible for notifying telephonically and in some cases written follow up notification to the applicable Operator personnel, the State Regulatory Authority and the Department of Transportation, Office of Pipeline Safety in Washington, D.C.

If the emergency involves a gas leak requiring excavation, the Gas Supervisor or Designee will be notified. During a major emergency, the Supervisor shall be responsible for notifying the appropriate management personnel. The Gas Supervisor the Designee shall be responsible for implementing Section 3.

If the emergency involves significant loss of service to customers, the appropriate management personnel shall be notified immediately. It shall be his responsibility to take

C.2 MAKING THE SITUATION SAFE

All actions taken by operator emergency response personnel shall be in accordance with approved **O&M Procedures. Refer to O&M Manual Section B-3**

Carbon Monoxide Procedure O&M Section H-9

Dig-in / Line Break Procedure O&M Section J-9

Gas Leakage Procedure O&M Section J-9

No Gas / Low Pressure Procedure O&M Section J-9

Gas Outage Procedure O&M SectionJ-9

C.3 EVACUATIONS

The decision to evacuate people from the area shall be based on the immediate danger to life and shall be at the discretion of the first arriving Operator employee. The decision to evacuate shall be reported to Dispatch as soon as practical. Evacuation of a building should take place if, in the judgment of the Operator personnel, an immanent hazardous exists.

Use of a building's existing evacuation plan shall be implemented whenever possible.

When Operator personnel are not first on the scene, the first arriving Operator employee shall assess the situation and advise those coordinating the emergency when in his opinion the need to evacuate exists, or to allow evacuees to return.

Small-scale, temporary evacuations may be handled by Operator personnel. Evacuees should be relocated to a safe location. The use of an Operator vehicle for a temporary shelter is appropriate when alternative locations are not available. The employee shall take necessary actions to ensure the security of the evacuated property before leaving the premises. This may involve notification of the police or safety and risk management personnel via the Dispatcher.

Large-scale emergency evacuations should be handled by the Fire Department. The Fire Department will typically arrange shelter for the evacuees.

all steps necessary to determine the extent of the outage and if unplanned, the cause of the outage.

C.4 POST-INCIDENT INVESTIGATION

After each incident in which the Emergency Plan was implemented, prepare a detailed written account of the event and actions taken during the emergency. The written account shall include:

- Date and time of the incident;
- Weather conditions;
  - wind
  - rain/overcast/clear
  - temperature
- People involved, and extent of injuries;
  - city employees
  - private citizens
- An outline of the particulars of the situation based on available information and relevant circumstances; and
- Estimated property damage and losses, including the cost of lost gas.

Contact Emergency Response Agencies to verify all information and circumstances, (fire and police).

Perform post-incident drug and alcohol testing in accordance with the Operator Substance Abuse Program. If employees contributed to the incident or cannot be completely discounted as a contributing factor substance abuse testing must be followed. Any decision not to administer a test shall be based on the best available current information. (Refer to Operator Substance Abuse Program)

If required, contact the Operator Human Resource Coordinator if necessary to assist employees who may be suffering from problems related to the incident.

Complete and file DOT and State Incident Reports. Telephone reports are due to the DOT within two (2) hours and to the State as discussed in section no. P-3.

Post incident investigation reports include:

- D.O.T. Incident Report RSPA - 7100.1 form
- Appropriate State(s) as required
- Investigation (complete description of incident, including people involved, facilities involved, damages, losses, notifications made etc.)
- Probable causes
- Conclusions
- Recommendations to prevent similar incidents from occurring in the future

A post incident review shall be conducted by the Gas Supervisor or designee and other emergency response agencies as appropriate to discuss the incident. During this review the emergency procedures used by emergency response personnel shall be examined. The primary focus of the post-incident review is to study:

- Adequacy; and
- Effectiveness of Emergency Plan;
- Response;
- Coordination,
- Actions taken; and
- Steps to prevent reoccurrence

Emergency Response Plan
INVESTIGATION OF FAILURE

D.0 SCOPE

Proper handling, movement or testing of gas piping or of the debris is essential to determining the cause of an incident. Improper handling may obliterate evidence that is important to gaining proper conclusions and to establishing the position of the Operator or others from a liability standpoint. For this reason, it is important that no action be taken that might disturb such evidence without the joint concurrence of the appropriate gas operator management individual or designee. Appropriate risk management and evidence should always be documented. Photographs should be included whenever possible. The inspection made to analyze the damage should be witnessed by impartial parties whenever possible.

Questioning of the public (property owners, tenants, witnesses and other persons directly involved) regarding the incident should be done by appropriate management personnel.

D.1 INVESTIGATION OF FAILURES

During or after any emergency an attempt shall be made to acquire any material or equipment whose failure may have been the cause of, or may have contributed to, the emergency. The purpose of this shall be to determine the cause of failure and minimize the possibility of a reoccurrence. **(Also Refer to O&M Section B-3)**

Make an analysis of the damage as described below:

- The appropriate personnel shall make an inspection of the damage to determine the cause
- If there are indications that an explosion occurred, determine if it had any particular center or unusual effects. Note the directions of movement of the floor, ceiling and walls. Observe the-indications of flash burns, paint blistering, etc.
- If gas piping is broken, examine the broken surfaces carefully for evidence of defects such as old cracking or deterioration and foul play
- Determine if there is evidence of recent alteration of the piping and if piping was properly supported by hangers
- Determine if there are containers in the building that may have contained flammable gas or liquid, or if other flammables were present
- Secure operator property and facilities as appropriate
  NOTE: When securing a piece of pipe or material, consideration to appropriate length for further testing. Pipe, a minimum of two feet in length and/or materials, a minimum of 1 foot either side of fittings.
- Properly identify and return damaged operator facilities to a secured operator location
- Document all actions utilizing appropriate operator forms

- Include appropriate materials failure with monthly report to the Plastic Pipe Data Sharing Program.

After the emergency has been resolved, an investigation into the cause of the emergency shall be made and if indicated, steps shall be taken to minimize the possibility of reoccurrence.

D.2 METER AND REGULATOR CHECK

Determine if the meter and service regulator serving the affected property are functioning properly as follows:

- Record the meter number and reading for use in calculating consumption since the last reading
- Determine if the meter will register on simulated pilot-light flow
- If practical clock the meter to determine leak amount during a two minute time frame
- Check the service regulator set pressure and lock-up pressure **O&M Section F-4**
- Properly secure operator facilities **O&M Section F-5**
- Follow approved operator O&M procedures

D3 CUSTOMER HOUSE PIPING CHECK

Determine the condition of the house piping by visual examination. Note the location of appliance connections, tools located near appliances and the position of the valves. **(Refer to O&M Section F-4)**

If the house piping does not appear to have been broken as a result of the incident, conduct a meter test on the piping to determine if there is leakage. An air pressure test, **at a pressure not exceeding the normal operating pressure**, may be conducted as an alternate to the meter test. Follow approved operator procedures.

D.4 SYSTEM OPERATION CHECK

Determine the system operating pressure at the time of the incident, as measured at the nearest pressure-recording gauge in accordance with approved operator procedures. **O&M Section h-7**

If pressure testing of operator facilities is appropriate, always test at **operating pressure first.** If no leakage or damage is uncovered, document the test and secure any appropriate evidence before proceeding. Should the pipe and or materials be returned to service appropriate pressure test shall be conducted in accordance. **(Refer to O&M Section H-3)**

Verify presence of adequate odorant. An impartial witness, preferably a member of the fire department, should be asked to make this test and complete the gas odorization form with utility personnel. **(Refer to O&M Section H-6)**

D.5 SERVICE HISTORY REVIEW

Compute the amount of gas consumed since the last meter reading, as indicated by the present reading. Compare this amount with previous consumption rates to determine if it is abnormal. Check service records to determine the following information:

- Date that service was inaugurated at the address.
- Date that the present meter was installed.
- Date and nature of any service work performed on the property.
- Date, nature and disposition of any leak complaint in the vicinity of the affected property

D.6 SYSTEM MAINTENANCE REVIEW

Review maintenance records to determine the date and method of recent leak survey work conducted in the area. If leaks were reported, determine their disposition. If system piping is cathodically protected, review the records of protection level. Determine if there has been recent construction work performed in the area by the Operator or others.

E.0 GENERAL

Following a major disaster declaration, federal financial assistance may be available to help State and local governments and certain private non-profit organizations to repair or replace damaged facilities. Since federal payments are based on final inspections and audits, proper documentation of costs is an absolute requirement. It is not enough just to complete the disaster repair work; that work must be fully and accurately documented.

E.1 DOCUMENTING DISASTER DAMAGE

Damage Survey Reports (DSRs), in many cases, will be written based on estimates for completion of approved disaster work. Approved funding may be adjusted prior to or at the time of final inspection, if justified and properly documented.

When you receive your approved DSRS, set up a separate file folder for each approved DSR. Place each DSR is its own folder. Each folder will then hold a separate item of work that is to be done. Each of these items of work must have supporting documentation to verify your claim.

Basically, there are two ways to complete items of work: one is by contract, and the other is by force account (using your own personnel, equipment and materials). The proper documentation in each case is described below.

E.2 CONTRACT WORK

You must have a copy of the contract and all invoices for each DSR. In addition, you must show on each invoice the date and amount paid and the check number. You must also keep a copy of the contract advertisement, a list of bidders and proof that you gave the work to the low bid contractor (all projects approved for $25,000 or more must comply with competitive bidding requirements). If you do not accept the low bid (there may be some acceptable reasons for not taking the low bid), indicate why and place this statement in the DSR folder. You may then give the contract to the next lowest bidder who is able to meet the terms of the contract. If the contract is for more than the DSR amount, notify the Governors Authorized Representative (GAR). **CAUTION: FEMA will not approve cost-plus percentage-of-cost contracts or any contract where payment for work is contingent upon federal reimbursement.** Any work done by either type of contract will be ineligible and no federal funds will be paid for it.

E.3 FORCE ACCOUNT WORK

During or immediately after the disaster, you should appoint someone to start keeping a record of repair costs. This person should have been designated and trained in advance. In addition, the person picked should attend the applicants' briefing that State and federal officials will conduct.

If you hire temporary workers or extra help to complete items of work (frequently done on emergency work such as debris removal), you must put them on your payroll and identify the job, wages, and period of employment.

If you use someone else's resources (personnel or equipment), you must document their use exactly as you would document your own. In addition, an invoice is required to show that you have paid for the use of those resources. This invoice must show the date and amount paid and the check number, as well as the services or materials being paid for.

The documentation needed to support a claim for force account work and how to organize it are outlined below.

Files

You may not receive approved DSRs until several weeks after the disaster. In the meantime, emergency work must be started. The problem is how to keep a separate record of costs for each DSR when you don't know what each DSR will cover. One way is to establish, immediately after the disaster, a separate folder for each emergency work project that you must accomplish before you receive approved DSRS. For example, if you have damage on three streets that must be repaired right away, set up a separate folder for each street, not one folder for all streets. If you have building repairs which must be made (such as repairing a roof to prevent further rain damage), set up a folder for each building. Eventually, you will receive your approved DSRs and a permanent folder can be established for each item of work. All expenditures for wages, supplies and equipment for each DSR must have supporting documentation in the DSR folder.

Labor

Employees must be on your payroll in order for you to be reimbursed for their work on disaster projects. The payroll must show the pay period, employee name, job classification, number of hours worked each day, total hours worked for the pay period, rate of pay (regular and overtime), total earnings, and paycheck number. This should not be too difficult since your payroll system should already include this sort of record keeping.

Your records must also show which DSR the employee worked on each day and each hour if he worked on more that one DSR in a single day. You must document your claims for each DSR individually.

Your time records must show how much time the employee worked on the DSR and how much time (if any) was spent on his regular job. Overtime must be shown on the payroll as being disaster related. Overtime pay must be in accordance with policies in use before the disaster. That means you can't pay overtime for disaster work if you didn't pay overtime for extra hours prior to the disaster.

You must set up procedures so you will know each day who worked on what disaster related job, for how long, and what he or she did. The Labor Record should be used to document hours worked on a disaster project. If an employee worked on two or more DSRs in the same day, a separate report for each DSR should be filed in the proper DSR folder.

You can't be paid for volunteer labor. If you don't pay for labor, FEMA won't pay you for it. However, you must keep a record of volunteer labor if you are claiming your equipment hours used by them.

Equipment

You must document equipment, your own and rented, used on each job. Specifically, your documentation must show the type and description, date used, hours used each day, total hours used, rate per hour, and total cost for each piece of equipment. **Equipment not in actual use is considered stand-by equipment and is not eligible for FEMA reimbursement.** You should use the Force Account Equipment Record or the Rented Equipment Record to document equipment used on each job. Place these forms in each DSR folder immediately upon starting work.

Operator costs associated with the use of equipment should be reported separately as part of the labor costs on the Labor Record.

If the equipment is rented, you must also show the date and amount paid and check number, Repair costs for rental equipment are not reimbursable.

Rates claimed for your equipment should correspond to those approved on FEMAs "Schedule of Equipment Rates". A copy is provided in the package of information provided to you at the applicants' briefing. You can also obtain a copy from the GAR. You should make a list of your equipment and note its size. This will enable you to determine the correct rate to charge. If you use a piece of equipment which is not listed on the rate schedule, FEMA will determine an applicable rate. You must provide the make, model number, and any other information which may help in establishing a rate.

Materials and Supplies

You must document materials and supplies, purchased or taken from stock, which you use on each job (DSR). Specifically, your documentation must show the unit price, quantity, total cost, description, date purchased, date used, job site, date paid, amount paid, and check number. For this purpose you will need a Materials Record. Each time any materials are used on the job, record the information on this form.

Claims for materials taken from stock must be supported by either the original purchase invoice or invoice for replacement materials. The materials invoice and check showing payment should be placed in each DSR folder.

Establish a separate file of vendor invoices for materials that are being used on DSR work. This will help you find the information you need to complete the Materials Record form.

E.4 GENERAL DOCUMENTATION REQUIREMENTS

Be sure that the dates on all documentation are within the allowable time period. This period is from the date of the disaster to the completion date of the work approved in the DSR.

DSRs will show a total amount recommended for each job; however, do not restrict your supporting documentation to these amounts. Small overruns, if justified and supported, will probably be approved during final inspection. Large overruns (exceeding 1 0% of approved costs) should be reported to the GAR as soon as you are aware of the overrun so that a supplemental DSR can be requested from FEMA. This step is critical because early approval of overruns is necessary. If a large overrun is not approved, you may lose a lot of money.

FEMA will pay only for repairs included in the DSR scope of work. If you decide to change or enlarge the scope of work, you must get FEMA approval. You should immediately inform the GAR of your proposed changes so that a request for approval of an "improved project' can be sent to FEMA. If the change is approved by FEMA, funding will be limited to the previously approved DSR costs. If you decide to use funds for a different public works type project than has been approved in a DSR, you must request approval of an "alternate project". If approved, funding will be limited to 90% of the amount approved in the DSR. See 44 CFR, Part 206, paragraph 206.203 (d) for an explanation of these funding options.

IT IS NOT ENOUGH JUST TO COMPLETE THE DISASTER REPAIR WORK. THAT WORK MUST BE FULLY AND ACCURATELY DOCUMENTED.

EMERGENCY RESPONSE PLAN
Reporting Requirements

F.0 SCOPE

Minimum Pipeline Safety Regulations for the state and federal governments require the reporting of certain incidents to the regulating agencies. These must be reported at the earliest practical moment by telephone. Data, for reporting a qualifying event/incident under 49 CFR Part 191, shall be gathered in accordance with the requirements specified below.

This section provides information regarding incidents that are reportable to a regulating agency and the method by which they shall be reported. A qualifying incident involving natural gas must be reported at the earliest practical moment following discovery **(within two hours)** by telephone if it is one that meets the requirements specified below in **F.1 and/or F.2**

F.1 FEDERAL - DOT

A. DOT Incident Definition

- An Incident involves a release of natural gas from a pipeline and
  - a. Caused a death or a personal injury requiring in-patient hospitalization; or
  - b. Caused estimated property damage (including cost of gas) of the Company, or others, or both, of $50,000 or more;
  - c. In the judgment of the Utility Director or the Designee was significant even though it did not meet any of the above requirements;
  - d. Resulting in gas igniting, explosion or fire.
- The Gas Supervisor or the designee shall be responsible for notifying the appropriate Federal and State agencies of any of the situations described above Notification shall be made at the earliest practical moment following the discovery of the incident. **(2 hours)**

B. DOT Telephonic Report

- Name of operator and person making the report and their telephone numbers.
- Location of incident.
- Time of incident.
- The number of fatalities and personal injuries, if any.
- All other significant facts that are known by the operator that is relevant to the cause of the incident or the extent of the damages.
- Report shall be made to:

  Pipeline and Hazardous Materials Safety Administration
  (800) 424-8802

C. DOT Written Report

- Written incident reports are to be filed utilizing **DOT form 7100.1 (03-04)**
- Written incident reports as required will be forwarded to the both the DOT and State (Excluding the State of California) as soon as practical, but no later that 30 days after detection.
- Possibly, because of the differences in defining an incident, the Operator may report some events to the state as incidents that need not be reported to the DOT. However, reporting an incident to the State does not relieve the Operator of its responsibility for timely reporting to the DOT when an occurrence meets the federal definition for an incident.
- DOT Written Report shall be submitted as to:

Pipeline and Hazardous Materials Safety Administration
Information Resources Manager
DPS-13
400 7th Street S.W.
Washington, D. C. 20590
(202) 366-3731
www.//OPS.dot.gov

F.2 STATE PUBLIC UTILITY REGULATORY AUTHORITY

As appropriate for the State or States involved

In the case of the State of California, no agreement currently exists between the Federal DOT and the State of California Public Utility Commission involving the State regulatory authority over municipal gas operators therefore, no reporting to the State of California is required.

Emergency Response Plan
Operator Emergency Contacts

NAME / TITLE	Operator Personnel	OFFICE	HOME	CELLULAR# PAGER #

OTHER RESPONSE AGENCIES / ENTITIES

State Public Utility Commission Pipeline Safety Division	24 hr. Message Recorder	______ ______
Department of Transportation -Office of Pipeline Safety Information Resources Manager Research and Special Programs Administration Room 8417, 400 Seventh Street SW Washington, DC 20590	National Response Center	1-800-424-8802
One Call Locate	*(USA / Blue Stake / Other)*	______
First Responders	Fire Department	______
Police	Highway Patrol Office Dispatch County Sheriff Office Dispatch City Police Office Dispatch Other	______ ______ ______ ______ ______ ______ ______
Others		______ ______
		______ ______
Utilities	Electric ______ Telephone ______ Cable TV ______ Water ______ Sewer ______ Other ______ Other ______	______ ______ ______ ______ ______ ______ ______

City of Victorville
Municipal Utility Services

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Issue Date:	
Superseded Date:	

MANUAL REVISION RECORD

Revisions Record System Beginning Date (__________________________) Upon Receipt

*If you have missed receiving **ANY** revision number, contact* ____________________

Revision No.	Revision Date	Section	Revision Changes
1			
2			
3			
4			
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O & M
INTRODUCTION

1.0 PURPOSE: (192.605)

This Operators O&M Plan Manual ensures the Operator's compliance with the requirements of 49 CFR Part 192. The Operator emphasizes public safety in the operation of its gas pipeline facilities in compliance with federal and state governing regulations.

1.1 SCOPE

A. Legislation
B. Regulation
C. Requirements
D. Definitions

1.2 ENABLING LEGISLATION:

The Natural Gas Pipeline Safety Act of 1968 authorizes the requirements for the Operation and Maintenance Plan.

1.3 GOVERNING REGULATIONS:

The Operation and Maintenance Plan is a requirement of, and is based on, 49 CFR Parts 191 and 192 (Minimum Pipeline Safety Standard) which is administered by the Office of Pipeline Safety (OPS), Pipeline and Hazardous Materials Safety Administration (PHMSA), in the U. S. Department of Transportation (DOT); and the applicable State Pipeline Safety Regulatory Authority. For information purposes, the Transportation Safety Institute, a function of PHMSA has published Parts 191 and 192 in a booklet entitled Minimum Pipeline Safety Regulations.

1.4 PIPELINE SAFETY IMPROVEMENT ACT OF 2002

On December 17, 2002 the President of the United States signed into law new legislation affecting the way natural gas systems are to be operated in the future including the qualifications of those individuals performing operations and maintenance tasks affecting the integrity of the countries natural gas facilities.

O & M
DEFINITIONS AND TERMS

2.0 PURPOSE

This section defines the important terms used in the operations and maintenance of jurisdictional natural gas facilities. The ultimate objective is to use one standard term for each subject.

2.1 DEFINITIONS AND TERMS

Abandon – means permanently removed from service

Abnormal Operating Condition (AOC) - a condition identified by the Operator that may indicate a deviation from normal operations and that may indicate an operating condition that could exceed design limits or result in hazard(s) to persons, property, or the environment.

Actual Operating Pressure (AOP) - The highest pressure at which a pipeline or pipeline segment actually operates during normal operation over a period of one year.

Anode - An electrically conductive material that discharges current into the ground to provide cathodic protection.

Automatic Shutoff - A device that will automatically stop the flow of gas when the downstream pressure exceeds a predetermined amount and will remain closed until manually reset.

Bare Pipe –Pipe that has no external coating

Backweld – The process of depositing weld material to bridge the gap created when pipe and/or fittings of different wall thickness are butt-welded together. This occurs on the inside of the pipe and/or fitting.

Bedding - The material placed between the bottom of the trench and the pipe to provide protection (Padding) where rocky areas or debris could cause damage to the pipe.

Bend - A means a change in direction in the pipe accomplished by mechanical means by deforming pipe.

Bleed - A small flow of gas that must be passed through some devices in order that they may operate.

Bond - A cable or other metallic connection between two or more structures in order to safely exchange current between them

Bore – An excavation method involving tunneling or drilling by one of multiple means

Bowing - A means for securing a change in direction of piping by utilizing the natural flexibility of pipe

Branch Connection - A pipeline segment, which is connected to a header (see lateral)

Branch Service – A lateral service line connected to another service line crossing one property line to service an additional customer

Business District – Principal business area(s) in the community, where large numbers of people regularly congregate, and/or engage in business activities such as purchasing, sales, manufacturing of commodities, or service.

Bypass - Piping which permits gas that, normally flows through a facility to flow around the facility when the facility is out of service, temporarily diverting gas from one portion of a pipeline to another portion for the purpose of tie-in, repair, etc.

Cadweld – A method of welding by the thermit process.

Capacity - The maximum flow that may be put through a device without causing its outlet pressure to drop below a predetermined limit.

Capping / Plugging - A device or a method of closing the end of piping to prevent flow.

Carrier Pipe - Pipe installed within a casing or sleeve that carries gas.

Casing – A section of steel pipe installed around a steel carrier pipeline, or pipeline segment for its protection, to facilitate its installation or carry superimposed loads. For plastic carrier pipeline, refer to "sleeve" in these definitions.

Cast Iron - An alloy of iron and carbon and small amount of other elements with a carbon content in excess of two percent. It is non-weldable and non-ductile.

Cathodic Protection (CP) – The process of protecting a segment of pipe from the affects of corrosion / Corrosion Control. This may involve appropriate protective coating and maintaining an electrical potential on a segment of piping so that electric current tends to flow onto the piping rather than to leave it.

Cathodic Protection Electrical Survey – A series of closely spaced pipe to soil readings over the pipeline i.e. Close Interval Survey (CIS), isolated section survey, and other that when analyzed to identify locations where current is leaving the pipeline.

Cathodic Protection Test Station - The physical equipment through which an accessible permanent electrical connection is made to underground pipelines, mains and services to make possible electrical measurements for cathodic protection.

Class Location - A geographical area 220 yards on either side of the pipeline by 1 mile long along the centerline of a pipeline where the pipeline is continuous through the 1 mile. The concept here is not one of blocks of land each fixed to a particular point on the ground, but rather that of a "window" which can be moved along the pipeline as an aid in analyzing building and therefore population density and the related safety liability or a "Sliding Mile". The four class locations are:

Coating - A protective layer or coating of durable material placed on the surface of pipe or other metal to prevent corrosion.

Cold Expanded - Seamless or welded pipe which is formed and then hydraulically expanded in the pipe while cold so that the circumference is permanently increased by at least 0.5 percent.

Commission – State Pipeline Safety Regulator

Compressor Station - A property and the facilities used to increase pressure.

Confined Spaces – Substructures with a restricted opening.

Control Piping - Small sized piping, which transmits pressure or flow to, or from regulators or the devises which control regulators.

Control Regulator - A small regulator used to maintain constant pressure at inlet to instruments or controls such as relays, actuators, etc.

Corrosion – The deterioration of a material, usually a metal, by a reaction with its environment. Corrosion may be Atmospheric, External, or Internal corrosion.

Corrosion – Active – means continuing corrosion which unless controlled could result in an unsafe condition.

Corrosion Control Monitoring – Evaluation of pipeline and pipeline facilities in areas of active corrosion. Active corrosion means continuing corrosion which, unless controlled could result in a condition that is detrimental to public safety including leakage or failure.

Customer Meter - A device for measuring the transfer of gas from the operator to the customer

Customer, Commercial – Classification of service to customers who are engaged primarily in the sale of goods and services, including institutions and government agencies.

Customer, Industrial – Classification of service to customers who engage primarily in a process that creates or changes raw or unfinished materials into another form or product. This includes electrical generation.

Customer, Residential - Classification of service to customers that consist of direct domestic usage in a residential dwelling for residential usage.

Covered Task – An activity, identified by the Operator, that meets the following four part test:

1. **Is performed on a pipeline facility;**
2. **Is an operations or maintenance task;**
3. **Is performed as a requirement of 49 CFR Part 192; and**
4. **Affects the operation or integrity of the pipeline**

Design Factor - A factor defined by the class location and other determinants, i.e., road crossing, railroads, etc., which determines the allowable stress level in the calculation of pipe design pressure.

Design Pressure - The pressure rating of a component or a segment of the piping system, as determined by the design procedures applicable to the material and/or pipe.

Distribution Line - A pipeline other than a transmission line or gathering line used to distribute gas to the customers which, operates at a hoop stress of less than 20% SMYS.

District Regulator Station - The physical equipment that controls the pressure of gas supplied to mains. Piping, valves and vaults are included.

DOT – The U.S. Department of Transportation

Ductile Iron - An alloy of iron and carbon with the carbon in spheroidal rather than flake form. It is non-weldable but relatively ductile.

Easement – An agreement with a property owner specifying certain use of the property by another party without transfer of ownership.

Equivalent Length - A length of piping of a given size that will provide an equal amount of some function such as surface or flow resistance as the length of piping or a fitting being considered.

Excess Flow Valve – An automatic shut-off device installed on a service line.

Extension Fitting - A short length of pipe on which a pressure control fitting has been installed and the pipe drilled out. It may be used to extend existing piping or to install laterals on piping thatis in service.

External Stress – The stress resulting from outside forces exerted on a pipeline or restraining the movement of the pipeline. Stresses include changes in temperature and the bowing of the pipe.

Feeder Line - A segment of piping used to supply other segments that are normally of smaller size. A feeder May be a large main or a high pressure main.

Filter - A device installed in the natural gas stream that contains one or more elements designed to remove particles entrained in a gas stream.

Fitting - A component of the piping system other than pipe, valve, regulator or similar item. Used to cap or connect piping or to change the direction or size of the piping.

Flow - The condition or pressure at which a regulator allows gas to feed. The volume of gas that is passing through a pipeline facility.

Gas – means natural gas, flammable gas, or gas which is toxic or corrosive. Other gases may include petroleum gas, nitrogen, oxygen, and others.

Gathering Line - A pipeline that transports gas from a current production facility to a transmission line or main

Header - A pipe on which one or more lateral or branch connections are provided. Also may be used to allow the connection of more that one parallel meters or regulators.

High Pressure Distribution System - Means the distribution system, which operates at a pressure significantly higher pressure than that provided to the customer.

High Consequence Areas – A high consequence area is an area defined as a class 3 or a class 4 location, plus additional criteria as defined under rule base on pipe classification, type, size, MAOP, etc…

Holiday – A hole or break in the pipe coating that exposes the metal surface.

Hoop Stress - The stress on a pipe caused by gas pressure at a line around the pipe's circumference at any arbitrary point along its length.

Houseline – The customer's gas piping after the outlet of the Operator's meter and the customer's gas appliances. By definition, houseline piping is not maintained by the Operator. (Yardline)

Hoop Stress – The stress in the pipe wall, acting circumferentially, which is produced by the pressure of the gas or liquid in the pipe.

Hydrostatic Test – A strength test utilizing water as the test medium.

Impressed Current – Cathodic protection current caused to flow from the anode by means of an external power source such as a rectifier.

Incident - An uncontrolled release of gas from a pipeline that results in an undesired consequence as defined by the DOT and/or State Pipeline Safety authorities

O & M
DEFINITIONS AND TERMS

Instrument Piping - Small size piping that transmits pressure or flow to instruments.

Insulation - A nonconductive material applied to piping to prevent or deter electric current or heat from entering or leaving the insulating piping.

Intended Operating Pressure (IOP) - The pressure as established by the designing engineer, at which a segment of the piping system is intended to operate to utilize the remainder of the system with the greatest efficiency. IOP is primarily determined by operating conditions and long range planning rather than physical equipment.

Lateral - A pipeline segment that is connected to a header or a mainline.

Listed Specification - This is a specification listed in the D.O.T., Appendix B, and adopted by reference.

Leak Investigation – An investigation to determine the gas leakage is the cause of an odor complaint, or failure during a leak test.

Leak Survey – The annual, 20%, or special survey conducted by the Operator to determine leakage using leakage detection equipment.

Leak Test - A test given to determine that a pipeline will not leak when subject to the pressure for which it is designed. It may be a pressure stand-up test or a soap bubble test.

Line Section – a continuous run of pipeline between pipeline appurtenances such and compressor stations, block valves, pressure reducing stations, etc…

Lock-up – The condition of the regulator at which no gas flows.

Low Pressure Distribution System - Means a distribution system that operates at a system pressure at the same, or nearly the same, pressure as that delivered to the customer.

Main - A distribution pipeline that serves as a common source of supply for more than one service line.

Malleable Iron - Annealed cast iron. It is non-weldable but moderately ductile.

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DEFINITIONS AND TERMS

Maximum actual operating pressure – means the maximum pressure that occurs during normal operations over a period of one year

Maximum Allowable Operating Pressure (MAOP) - This is the maximum design pressure at which the pipeline facility may operate. MAOP is generally established through a qualification pressure test of the facility. The MAOP of a pipeline facility is equal to the lowest MAOP of any segment or component of the pipeline facility.

Meter Manifold – One service regulator handling more the one customer meter other than a regulator station

Metering Station - A facility used to measure large volumes of gas to industrial or resale customers, or to measure gas for accounting purposes, including all valves, regulators and other appurtenances, as well as the meters installed in the facility.

Meter Set Assembly (MSA) - The piping, including any valves or regulators, which is necessary to enable a meter to service a customer. It consists of the piping from the service shutoff to the house line.

Miter Weld Bend - A means for securing a change in direction of piping by cutting an angle and welding.

Municipality – means a city, county, or any other political subdivision of the state

Odorant – A substance (mercaptain) added to or previously existing in natural gas to make it readily detectable through the sense of smell.

Odorization – The process of adding concentrations of odorant to a gas stream so that the odor is detectable at $1/5^{th}$ of its Lower Explosive Limit (LEL).

Operator - A person or company who engages in the transportation of gas.

Orifice – An installed restriction in piping to limit flow or to produce a pressure differential.

Over-Pressure Protection - A secondary device to prevent the pressure in a segment of the piping system from exceeding its MAOP if a primary device for this purpose fails. It may be a regulator, pressure relieving device or pressure limiting device.

Padding – The sandy type material (Bedding) placed between the pipe and the bottom of the trench to provide protection where rocky areas or debris could cause damage to the pipe.

Petroleum gas – propane, propylene, butane, or mixtures of gases

Pipe – means any pipe or tubing used in the transportation of gas including pipe type holders. A rigid conduit with a wall thickness and outside diameter corresponding to iron pipe sizes.

Pipeline - All parts of those physical facilities through which gas moves in transportation, including pipe, valves and other appurtenances attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders and fabricated assemblies.

Pipeline Facility - All new and existing pipelines, rights-of-way, and any equipment, facilities or building used in the transportation of gas or in the treatment of gas during the course of transportation.

Pipeline Environment – includes soils resistivity, soil moisture, soil contaminants and other know conditions could affect the probability of active corrosion.

PHMSA- Pipeline and Hazardous Materials Safety Administration of the US Department of Transportation (Formally OPS)

Pipe to Soil – The potential reading taken between the pipe and a copper sulfate electrode in contact with the electrolyte.

Polyethylene (PE) - Plastic pipe material

Polyvinyl Chloride 2116 (PVC) - Plastic pipe material

Pressure Control Fitting – A fitting installed on the pipeline to stop or redirect the gas flow.

Pressure Indicating Device – A device utilized for indicating pressure, such a gauges and pressure recorders.

Pressure Limiting Device - A device that limits the maximum pressure imposed on downstream piping to a present value.

Pressure Test – A test performed to verify the strength of a pipeline and/or to determine if leakage is present.

Pressure Reducing Station – Terminology used for regulator station assemblies such as district regulator station, property line regulator and farm tap.

Pressure Relieving Device – A device that will vent gas to the atmosphere or a lower pressure when operating pressure exceeds design limits.

Purge - Displacement of gas with air or air with gas **without** forming an explosive mixture.

Rectifier – The means of changing alternating (AC) current to direct (DC) current for the purpose of cathodic protection.

Regulator - A device that automatically controls the pressure to the piping system downstream of the device to a preset value.

Regulator, Control – a small regulator used to maintain constant pressure at the inlet to instruments or controls

Regulator, Monitor – A regulator used in series with a working regulator or service regulator, set to control downstream pressure at a slightly higher value than the working regulator, so as to provide overpressure protection should the working or service regulator fail in the open position.

Regulator, Pilot – A regulator used to provide a small flow of gas to control a larger regulator.

Regulator, Series - Two- or three-stage regulation: pressure regulation accomplished by placing two or three regulators in series, each regulator providing a reduction in pressure independent of the other.

Regulator, Service or Customer - A device on a service line that controls the pressure of gas delivered from a higher pressure to pressure delivered to the customer. A service regulator may serve one customer or multiple customers through a manifold. (Residential and small commercial customers)

Regulator Station – The facility that controls the pressure of gas supplied to downstream pipelines. (District regulator station, city gate farm tap, etc)

O & M
DEFINITIONS AND TERMS

Regulator, Working – A regulator in an MSA or regulating station which is controlling downstream pressure to the IOP and which is in series with a monitor regulator providing protection.

Remedial Action – A remedy or an action plan to remedy or correct deficiency.

Right-of-Way – A legal right of passage across or right to use another's property.

Riser – Piping used to connect an underground service line to an aboveground MSA. (Also anodeless riser)

Safety Related Condition – A condition that represents a potential threat to system integrity

Shading Material - The material placed between the pipe and backfill material to provide protection where rocky areas or debris could cause damage to the pipe.

Secondary Stress - Stress produced by loads other than internal pressure.

Service Line - A distribution line that transports gas from a common source of supply to a customer, to two adjacent or adjoining customers or to multiple customers served thru a meter manifold. The service line ends at the outlet of the customer meter or connection to a customer's piping, whichever is farther downstream or the connection to a customer's piping if there is no customer meter. (Residential and small commercial customers)

Shading – The sandy type material placed above the pipe, between the and the first lift of backfill material.

Sleeve, Plastic Carrier – A steel or plastic pipe installed around a plastic carrier pipe to provide protection, facilitate its installation, or carry external loads.

Sleeve, Steel Carrier – A short section (3 feet or less) of plastic pipe to protect a steel carrier pipe as it passes through concrete or other material.

Shall - Mandatory requirement.

Should - Recommended practice.

O & M
DEFINITIONS AND TERMS

Span – An unsupported length of pipeline.

SMYS - Specified Minimum Yield Strength. The minimum yield strength for steel pipe manufactured to a known specification; it is the minimum yield strength as determined by the provisions of 192.107(b) for steel pipe of unknown specifications.

Standard Service - A distribution line on private property that supplies a customer on that property. If more than one customer meter or connection is supplied on that property, that standard service will extend this service to the most remote meter or connection.

Static Line - Control piping for the purpose of sensing the pressure controlled by a regulator.

Steel - An alloy of iron and carbon and a small amount of other elements with carbon content of two percent or less. It is weldable and ductile.

Strainer - A device for separating and collecting solid particles in a gas stream

Strength Test - A test given to piping to determine that it will not fail or leak when subjected to pressure for which it is designed.

Stress - A force tending to deform piping expressed in terms of psig.

Stress Relief - Elimination of secondary stress by intentional creation of a stress greater than yield strength or the application of heat.

Tap - A connection to piping through which gas may be obtained.

Test Medium - The material that is used to put a pipeline system under pressure as part of a required test operation following construction or repair. The medium may include liquid, air, natural gas, or a compatible inert gas.

Tie-in – The joining of two previously completed pipeline segments of piping or the joining of a new pipeline segment to the existing pipeline.

Transition Piece - A short length of pipe used to join two pieces of pipe with differing wall thicknesses by welding. Its wall thickness is between the thicknesses of the pipes to be joined. A transition piece may also be used to join steel and plastic.

O & M
DEFINITIONS AND TERMS

Transmission Line - A pipeline, other than a gathering line that:

1 MAOP that produces a hoop stress equal to or greater than 20% of SMYS

2. Transports gas from a gathering line, storage facility, or another transmission line to a distribution center, storage facility or large volume customer that is not downstream from a distribution center

3. Transports gas within a storage field

A large volume customer may receive similar volumes of gas as a distribution center, and including factories, power plants and industrial customers.

Transportation of Gas - The actual gathering, transmission or distribution of gas by pipeline or the storage of gas in or affecting interstate or foreign commerce.

TSI – The Transportation Safety Institute

Valve - A mechanical device for stopping or manually controlling flow in pipe.

Vault - An underground enclosure used to make buried piping facilities readily accessible.

Vent Line – Pipe used to conduct the discharge of vented gas from a regulator, casing vault or other location to a suitable location.

Wedding Band - An axially split, short length of cylindrically formed plate welding onto a pipeline to cover a defective weld or other defect on a pipeline.

Welding - A process for joining two pieces of metal by fusing them together with or without filler metal.

Work Day – Excluding Saturday, Sunday and federal holidays

PROCEDURES
SAFETY / GENERAL

1.0 PURPOSE

The following Safety Section is for the purpose of identifying specific hazards and to establish procedures to eliminate incidents. The approved operating instructions shall be followed. These requirements shall apply to all individuals engaged in gas operations, including those individuals doing work on rights-of-way and on pipeline facilities or customer property.

1.1 SCOPE

A. Personal Safety
B. Protection of General Public
C. Confined Space Entry
D. Traffic Safety
E. Prevention of Accidental Ignition
F. Lock-out Tag-out
G. Excavation Safety
H Pipeline Security
I Start-up & Shut-down
J AOCs
K System Integrity
L Public Awareness

1.2 GENERAL

A. All work shall be arranged and conducted with a primary view to the safety of the employee, and all other individuals as may be affected by the work, including people property and the environment and the public welfare in general.

B. Each employee shall be familiar with the general safety and regulatory compliance rules.

C. The following Safety Section is not meant to cover all potential situations and details. More specific information on safety, and specific procedures related to a work assignment may be found in other sections of this manual, specific project work plan and should be discussed with all appropriate individuals prior to the start of work.

PROCEDURES
SAFETY / GENERAL

D. All employees are to be continually watchful and alert to ensure adherence to the safety plan:

- Plan ahead: Visualize the project and think of everything that might be dangerous.
- Prepare your Space: Eliminate potential risk factors such as clutter and debris.
- Dress for success: Appropriate work attire, including PPE, for the job will help to eliminate risks.
- Read labels
- Use the appropriate tools
- Properly clean, maintain and store your tools
- Be Smart
- Know what you are doing or don't do it
- Don't try to do everything at once and don't rush

PROCEDURES
PERSONAL SAFETY

2.0 PURPOSE

Each employee is responsible for their own safety as well as the safety of their co-workers, the general public, property, and the environment. Job appropriate personal safety equipment (PPE) shall be worn by all individuals engaged in work with and on the pipeline facilities.

2.1 SCOPE

A Personal Safety Equipment

B. Personal Injury

2.2 SAFETY EQUIPMENT

A. Ear Protection

Operator / OSHA - approved ear protection shall be worn while performing or working in the area of any operation that exposes the ears to sparks and flying weld metal or any high-noise-level environment (at or above 90 decibels) that could damage hearing. Work activities that generally require hearing protection may include:

1. Purging operations, compressor or pump stations
2. Using jackhammers, air spades, tampers or other heavy equipment.

B. Eye Protection

OSHA approved shatter resistant goggles, safety glasses, face shields or other devices furnished for eye protection shall be kept clean and properly adjusted. Such devices shall be worn when an employee is engaged in or is in the vicinity of work involving:

1. Posted as job site requirement
2. Drilling or chipping stone, brick, concrete, paint, pipe coating or metal
3. Grinding, buffing or wire brushing
4. Dust or flying particles
5. Welding or cutting
6. The use of hot or dangerous substances
7. Injurious light or heat rays

8. Any other job where there is danger of eye injury.

C. Eye Protection / Arc Welding

Anyone in the vicinity where arc welding is being performed shall be made aware of the dangers of watching an electric arc. Persons standing nearby shall be warned before an arc is struck. If possible, use curtains or protective shields made of fireproof materials. Welders shall wear approved arc welding hoods with (#10 to #12 shade lens). **All individuals involved in arc welding operations should have and wear appropriate eye protection.**

D. Foot Protection

Appropriate protective footwear shall be worn at all time during the performance of work where there is exposure to foot hazards. This includes a sturdy leather upper and impact resistant toe or slipover foot shield where appropriate for such tasks as operating tampers, clay spades, pavement breakers and rock drills and other power operated equipment.

E. Gloves

1. Leather work gloves shall be worn whenever there is a possibility of hand injury.
2. Other protective gloves shall be work where exposure to potentially damaging chemical or other products is present.

F. Safety Hats

1. OSHA approved hard hats shall be worn when there is a possibility of head injury and in designated areas.
2. Hard hats shall not be altered or modified in any manner.

G. Respirators

Respirators shall be used by the employees where adverse atmospheric conditions due to dusts, vapors, fumes, mists, etc., are encountered.

1. The appropriate respirator and filter cartridge as applicable shall be utilized

for varying conditions.

2. Respirators shall be regularly inspected, cleaned and maintained in accordance with Manufacturer's Operation Manual.
3. All, supply air respirators (air lines, air tanks, SCBA), shall have a monthly inspection.
4. All employees who may be required to use supplied air respirators shall be instructed in their proper adjustment and use.
5. Employee fit tests shall be conducted annually.
6. A supplied air respirator, fire resistant suit, safety harness, and leather gloves are considered a unit and shall be worn as such.

H. Safety / Traffic Vests

1. OSHA approved, bright color, traffic safety vests shall be worn by all employees when working at a job site on or adjacent to any roadway.
2. Where work area protection, i.e., warning signs, barricades, cones, etc., are required.
3. Where posted

I. Fire Safety Equipment

Steps shall be taken to eliminate potential sources of ignition from the work area prior to the start of any work. (See section B-6 Prevention of Accidental Ignition) Each individual when working in a gaseous atmosphere or potential gaseous atmosphere wear approved fire resistant suit/protective coveralls, breathing-air and mask, leather gloves and approved rescue harness.

Appropriate, survivable fire protection is best accomplished by dressing in layers consisting of fire retardant and fire resistant clothing. The recommended layering is as follows:

1. All / 100% cotton undershirt and underpants
2. Fire retardant shirt (retardant chemical added to material)
3. Fire resistant coveralls (material is fire resistant), 6 oz NOMEX or equivalent
4. Fire resistant, insulated coveralls, 12 oz NOMEX or equivalent

Note: In all cases, every effort should be made to avoid working directly in a gaseous atmosphere until the situation / gas flow has been controlled.

2.3 PERSONAL INJURY

Steps shall be taken to ensure that at least one individual / company employee trained in first aid and CPR shall be present on all job sites. Whenever and wherever a personal injury, company employee or other, occurs, each individual should:

1. Take necessary actions to preserve human life.
2. Administer First Aid.
3. Notify Emergency Agencies / (911 or other job specific entity)
   - Give location of Emergency;
   - Give type of Emergency; and
   - Assist Emergency Personnel.
4. Notify immediate supervisor, safety administrator and / or other appropriate project management.
5. Complete appropriate Injury Reports

PROCEDURES
PROTECTION OF GENERAL PUBLIC

3.0 PURPOSE

The following section addresses the primary safety requirement of all individuals to take actions to protect people, property, and the environment first, while performing any work on or around the pipeline facilities.

3.1 SCOPE

A. First Response

B. Odor / Leak Investigation

C. Controlling Gas Flow

3.2 ACTIONS TO BE TAKEN IN PROTECTING PEOPLE, PROPERTY AND ENVIRONMENT

A. THE FIRST OPERATOR EMPLOYEE(S) AT THE SCENE WILL IMMEDIATELY:

1. Assess the situation to determine the potential hazard to life, property, and/or the environment. Check for the presence of gas in the area involved, including inside buildings or structures as appropriate. If denied access to the site by anyone, contact dispatch and request management assistance.
2. Investigation shall be **continuous** until the safety of all persons, property and the environment can be established. If warranted, begin evacuation of the area and involved structures; the assistance of Fire/Police shall be considered. Give appropriate warning about not using electric switches, motors, smoking, etc.
3. If emergency agencies (fire, police) are present, establish contact with the representative in charge upon arrival and prior to departure. When emergency agencies are not present, request their assistance if necessary.
4. In situations where the first employee(s) on site is/are unable to complete their normal investigative functions, contact dispatch and request management assistance.
5. If gas facilities are in the vicinity and the incident involves a fire or explosion, contact dispatch and request management assistance.
6. If gas facilities are in the vicinity and it is unclear whether gas is involved or

not, contact dispatch and request management assistance.

7. Secure the area with barricades, signs or other appropriate warning and safety devices including soliciting the assistance from authorities when available.
8. If possible, shut off supply of gas to immediate area involved following appropriate Gas Control procedures. If gas is blowing to atmosphere, stand by to secure the involved location and request appropriate help from dispatch. Keep all non-employees from area.
9. Inform any third party operators not to operate any equipment which might be in the immediate area.
10. Stand by in immediate area until relieved or reassigned. If the job is turned over to another company employee, all actions taken must be relayed to the person accepting the job.
11. Upon being relieved of responsibility, or as soon as practical, complete all appropriate documents providing as much detail as possible on the incident. Include times, actions taken, names of witnesses, observations made, etc.

B. **SUPERVISOR-IN-CHARGE**

1 The Supervisor in Charge shall be responsible to take the necessary action to protect life first, property and the environment, and to direct appropriate personnel to respond to the emergency.

2 Coordinate with the Fire Department and law enforcement officials to control the emergency. The Supervisor-In-Charge shall participate in decision making with the Incident Commander when necessary for a unified command. When the Fire Department has responded to an emergency and is on-site, the Supervisor-In-Charge or designee shall identify himself to receive proper cooperation. The Fire Department will secure the area of the incident and coordinate with law enforcement to establish traffic/crowd control to prevent entry into dangerous areas by unauthorized personnel.

- Check on the condition of any injured parties
- Report information to the appropriate management personnel
- Provide media with on-site information, when appropriate
- Coordinate with the Fire Department to secure valuables and haul debris to a secure site
- Declare the emergency "Under Control", when appropriate
- Notify appropriate Operator personnel to initiate service outage restoration and failure investigation, as appropriate

PROCEDURES
PROTECTION OF GENERAL PUBLIC

The above guideline is general in nature and its primary use will be for the training of personnel prior to emergencies. During an actual emergency, the personnel responding to the emergency will be required to exercise their individual judgment to take the appropriate actions considering all apparent circumstances.

C. CONTROL OF GAS FLOW

1. After the appropriate steps have been taken to secure the area and to protect the general public, steps must be taken to control the flow of escaping gas.
2. Management personnel shall examine maps and/or pertinent records of the immediate area and determine what gas control facilities are available and what procedures are appropriate.
3. To control the flow of escaping gas, the following methods, depending upon the situation, can be utilized:

   (a) Manual or Hydraulic Squeezers
   (b) Stopping Equipment
   (c) Approved Leak Repair Clamp
   (d) Valves
   (e) Pressure Reduction
   (f) Isolation Plan (normally to be used for a catastrophic event that effects a major portion of the system)
   (g) Other methods as may be appropriate for the situation.
4. During any emergency, when a valve or other method is used to reduce pressure or shut off the flow of gas, verify the actions taken through the use of a gauge and/or soap bubble test downstream of the control point.
5. Consideration should be given to preserving potential evidence when determining the means and location of securing the gas flow at an incident; however protection of life and property is always the first priority.

Refer to Sections C-8 and D-5 for additional details related to controlling gas flow involving plastic pipe and steel pipe respectively.

PROCEDURES
CONFINED SPACE ENTRY

4.0 PURPOSE

Certain work locations may present potential hazards due to the confined nature of the location. In such locations where there exists the potential for oxygen deficiency, potential hazardous chemicals or fumes, or the presence of a gaseous condition, the following safety procedures shall be adhered to.

4.1 SCOPE

A. Confined Space entry

B. Rescue Harness

4.2 GENERAL

In general, Sunrise Engineering employees shall not, under normal circumstances, enter or work in confined spaces unless absolutely necessary for the completion of the work assignment. Should such job specific work assignment require confined space entry, each individual shall be properly trained and qualified before starting work and follow the following guidelines:

1. When working in locations where oxygen deficiency or gaseous conditions can exist, the atmosphere shall be tested.
2. When flammable or hazardous gases are present, adequate ventilation shall be provided, and sources of ignition shall be eliminated. Every effort shall be made to control the gas flow and eliminate the gaseous atmosphere before proceeding.
3. Before the start of work, secure the area and post appropriate safety and warning signs.
4. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, fire suit and fire extinguisher, etc., shall be readily available where adverse atmospheric conditions exist or could be expected to exist.

4.2 ENTERING CONFINED SPACES

Confined spaces include, throat-type vaults; vaults where all covers have not been removed, and tunneled and bored excavations in which other substructures restrict the opening.

A. Before entering a confined space, check for the presence of explosive gas or oxygen deficiency.

1. Natural Gas: 2.5% represents a hazard
2. Oxygen: Less than 19.5% is not sufficient

B. No employee shall enter any vault or substructure with a restricted opening, or any other vault, manhole structure, or excavation that is surrounded by confining surfaces that will permit the accumulation of gas, without another employee above ground.

C. Confined spaces greater than four feet in depth require a ladder for entering and exiting

D. Before entering, clear floor, steps, and ladder of any slippery substance, debris, or moisture to avoid slipping.

E. Confined spaces shall be ventilated before and during any of the following procedures:
1. Painting.
2. Cleaning with any solvent other than water.
3. When it is necessary to open any piping, or other device, which might result in the release of gas.

NOTE: All fittings and pipe to be separated or removed shall be grounded.

4. When pre-entry test detects gas at or above the lower explosive limit (4.5% gas in air), or gas is likely to accumulate at or above the lower explosive limit during work activity.
5. When welding, flame cutting or doing any job that requires fire.
6. When doing any work where ventilation would reduce the hazards of the job.
7. When using any chemical product that could result in an unsafe level of harmful gas or vapor.

4.3 RESCUE HARNESS

When entering a vault or excavation where hazardous atmosphere exists; Fire resistant coveralls and insulated suit, breathing-air and mask, rescue harness and leather gloves shall be worn. **(See Section B-2)**

1. The approved rescue harness shall be equipped with a rope long enough to extend a

safe distance from the excavation, but not less than 25' in total length.

2. The rope should be knotted approximately every 2 linear feet beginning at the loose end for approximately 15', and shall be made of cotton or a flame retardant material.
3. Should a mechanical lifting device be utilized, the rope shall conform to the manufactures specifications.

PROCEDURES
TRAFFIC SAFETY

5.0 PURPOSE

The purpose of this section is to identify procedures for safely working in locations, streets, highways, and others where vehicular traffic may be present.

5.1 SCOPE

A. Use of Barricades

B. Flagging

C. Securing Excavations

5.2 TRAFFIC SAFETY

A. Barricading of job site and traffic control shall be done in accordance with local requirements.

1. Because the great majority of our underground structures are on public streets and highways, safe control of the flow of traffic is essential. Effective barricading is the primary means of both protecting the crew members while working in the street and protecting the public from hazards incurred by our excavations. The crew leader will be responsible for placing of barricades, signs, flagperson, etc., in compliance with the governing body to:

(a) Maintain as free a flow of traffic as practical.
(b) Protect the crew from traffic.
(c) Protect motorists and pedestrians.
(d) Protect excavations which are left open and unattended during darkness.

B. Excavations left open overnight or on weekends shall be sufficiently secured by one or more of the following methods:

(a) Barricades with lights or barrier tape.
(b) Steel plates.
(c) Planks.
(d) Plywood.

(e) Fence.

C. When necessary to work in streets or highways, equipment should be parked so as to give protection to the crew from the traffic. Discretion must be used at all times when parking on a highway.

D. When it is necessary to park trucks along a ditch, they should be headed in the direction of traffic if possible. Equipment should be parked to keep streets, alleys, driveways sidewalks, fireplugs and especially stop signs clear. Stop signs should never be blocked or obstructed from the view of traffic. Park in such a way as to be least obstructive to traffic, pedestrians and Operator personnel, or install temporary traffic control as needed.

1. While parked on streets or in alleys, vehicles should have signs or cones placed fore and aft.

D. A number of hand signaling devices, such as STOP/SLOW paddles, lights and red flags are used in controlling traffic through work zones. The sign paddle bearing the clear messages STOP or SLOW provides motorists with more positive guidance than flags and should be the primary hand signaling device. Flag use should be limited to emergency situations and at spot locations which can best be controlled by a single flagger.

E. Sign paddles should be at least 18" wide with letters at least 6" high. A rigid handle should be provided. This combination sign may be fabricated from sheet metal or other light semirigid material. The background of the STOP face shall be red with white letters and border. The background of the SLOW shall be orange with black letters and border. When used at night the STOP face shall be reflectorized red with white reflectorized letters and border, and the SLOW face shall be reflectorized orange and black letters and border.

F. Flags used for signaling purposes shall be a minimum, of 24" x 24" in size, made of a good grade of red material securely fastened to a staff approximately 3' in length. The free edge should be weighted to ensure that the flag will hang vertically, even in heavy winds.

G. The following methods of signaling with sign paddles should be used:

1. To STOP traffic. The flagger shall face traffic and extend the STOP sign paddle in a stationary position with the arm extended horizontally away from the body. The free arm is raised with the palm toward approaching traffic.

2. When it is safe for traffic to proceed, the flagger shall face traffic with the SLOW sign paddle held in a stationary position with the arm extended horizontally away from the body. The flagger motions traffic ahead with the free hand.

3. When it is desired to alert or slow traffic, the flagger shall face traffic with the SLOW sign paddle held in a stationary position with the arm extended horizontally away from the body.

H. The following methods of signaling with a flag should be used:

1. To stop traffic, the flagger shall face traffic and extend the flag horizontally across the traffic lane in a stationary position so that the full area of the flag is visible hanging below the staff. For greater emphasis, the free arm may be raised with the palm toward approaching traffic.

2. Where it is desired to alert or slow traffic, by means of flagging, the flagger shall face traffic and slowly wave the flag in a sweeping motion of the extended arm from the shoulder level to straight down without raising the arm above a horizontal position.

I. When required, flagperson(s) shall obtain and maintain any and all necessary regulatory qualifications.

PROCEDURES
PREVENTION OF ACCIDENTAL IGNITION

6.0 PURPOSE (192.751)

All possible precautions shall be exercised to prevent the accidental escape and ignition of gas. Whenever possible, potential sources of ignition should be eliminated prior to the commencement of work.

6.1 SCOPE

A. Escaping Gas
B. Leak Repair
C. Static Electricity
D. No Smoking
E. Combustible Atmosphere
F. Preventing Air from Entering

6.2 ESCAPING GAS HAZARDS AND PREVENTION OF IGNITION

Escaping gas may follow a ditch or excavation for an appreciable distance if air currents are favorable, or if gas is blowing directly up at the ditch or excavation. The public must be kept a safe distance at all times even if the area must be roped off in order to do so. The following procedures are observed where sources of ignition may be involved:

A. Post warning signs as appropriate, provide a fire extinguisher and remove all potential sources of ignition from the area when the presence of gas or the proposed venting of gas into the air may create a hazard of fire or explosion.

B. Do not turn on electrical circuits, including flashlights not approved for a gaseous atmosphere, in an area where gas is present. Electrical tools, cords, and generators used with plastic fusion may also considered possible sources of ignition.

C. Do not weld or gas cut pipe or other facilities containing a combustible mixture of gas in air. This does not prohibit the "Fire Controlled" tie-in method. This method allows the welding operation to go on while gas is present at slightly higher than atmospheric pressure.

D. Precautions against possible ignition from static electricity in gaseous atmosphere are taken when work with plastic pipe is performed, i.e., purging operations, leak repairs or with broken or damaged lines.

E. Use only lighting equipment approved for use in a gaseous atmosphere, including flashlights, in or adjacent to an area of possible ignition.

F. Do not use open flames of any kind for the purpose of detecting and/or localizing gas leakage or suspected gas leakage in mains or services under any circumstances. Use combustible gas indicators and/or soap bubble testing to detect and/or localize leakage.

G. The practice of "flashing" bell holes before entering them for the purpose of welding, etc. When flashing, do not flash bell holes containing plastic piping under pressure. Use a combustible gas indicator to detect gas leakage.

6.2 LEAK REPAIR PROCEDURES

A. Location of Vehicle

Park Utility vehicles a safe distance from the leak. If wind is present, always park upwind from the leak.

B. Warning the Public

"No Smoking" signs, barricades and caution tape shall be posted (220 linear feet around the site). When on or near a public roadway, personnel shall be stationed on both sides of the restricted area to stop vehicles and to warn the public. They shall use red flags during the day and electric trouble lights at night.

C. If the leak is major and is near a residence or business establishment occupants shall be contacted immediately and warned to extinguish all fires.

D. Prepare for an Emergency

Evaluate the situation. Be prepared for the worst before starting to repair even minor leaks. Check location of available valves, and work out any necessary shutdown and rerouting procedures.

PROCEDURES
PREVENTION OF ACCIDENTAL IGNITION

E. Have Tools and Supplies Ready

Have the right tools and materials on the job before the leak is uncovered. Be sure the clamps, bolts, nuts, wrenches and other items are ready and in a handy and safe place. Be sure all threads are clean, oiled and in good condition.

F. Take Steps to Prevent Fire

Extinguish or move to safe distance all possible sources of ignition. Matches, cigarette lighters, friction lighter, etc., shall be left in the truck.

G. Reduce Pressure

When making repairs on high-pressure lines, gas pressure may be reduced as authorized by your supervisor.

H. Prevent Sparks

When using picks and shovels, be extremely careful to prevent striking sparks.

I. Protect the Eyes

Wear approved eye protection when excavating around the pipe, as well as when actually repairing the leak.

J. Excavating

Make the excavation large enough for ample working room around the pipe. Do not disturb the dirt covering the actual leak until the very last. This will minimize the amount of digging to be done while the leak is blowing.

K. Stay Clear of Gas

Always stay clear of a blowing stream of gas. Stand behind or to one side of the stream.

L. Signaling

Have prearranged signals to direct work in repairing a break or leak. The noise from a high-pressure leak makes hearing extremely difficult. Use approved ear protection when working on a high-pressure leak.

M. Number of Employees

The severity of the leak or line break will determine the number of employees required to safely control escaping gas. **No person shall enter a gaseous atmosphere in a confined space without another person outside of the confined space..**

N. Fire Extinguishers

A minimum of one 20-pound, dry chemical fire extinguisher shall be kept in readiness while repairing a line break, making a tap on a hot line, during welding processes, or where any possible escape of natural gas and source of ignition might occur. Before starting repairs, the employee in charge shall decide whether to extinguish the fire or let it burn in the event the escaping gas is ignited.

O. Methods of Gas Flow Control

1. The following methods may be used to control gas flow:

   (a) In-line valves.

   (b) Pressure control (linestopper) fitting.

   (c) Pipe squeezing.

   (d) Repair clamps.

   (e) Expansion plug.

2. When determining what type of flow control to use in an emergency, good judgment shall be exercised to avoid entering a gaseous atmosphere whenever practical. Emphasis shall be placed on customer and employee

safety when determining flow control. No person shall enter a gaseous atmosphere in a confined space without proper safety equipment including breathing apparatus, and another person outside of the confined space.

6.3 STATIC ELECTRICITY

Polyethylene plastic pipe does not readily conduct electricity however a static electric charge can buildup on inside and outside surfaces, and stay on the pipe surface until some grounding device such as a tool or a person comes close enough for the static electricity to discharge to the grounding device.

Discharging one part of the pipe surface will not affect other charged areas because static electricity does not flow readily from one area to another. Polyethylene pipe cannot be discharged by attaching normal grounding wires to the pipe.

A static electricity discharge to a person, a tool, or a grounded object close to the pipe surface can cause an electric shock or a spark that can ignite a flammable gas or combustible dust atmosphere causing fire or explosion.

Precautions against possible ignition from static electricity in a gaseous atmosphere shall be taken prior to performing the work.

A. Plastic Pipe: A wetting agent on the surface of the pipe provides a conductive path to rapidly diffuse static electricity.
   1. The rags or burlap must remain wet with soapy solution during the entire operation.
   2. All pipe in the work area shall be wetted with a soapy water solution* from soil to soil the full length of the excavation.
   3. Make sure that contact with the soil is made at the ends.
   4. For purging operations of 5' or less, the above method can be utilized for dissipating static electricity. For purging of sections over 5' in length, **refer to CS H-5, Purging.**

When performing any maintenance, splices, repairs, taps, etc. on any existing plastic gas lines, control of static electricity is a major concern. The following is the procedure to be used in static electricity control:

1. Expose pipe by excavating below pipe to working area desired

2. Clean off exposed plastic pipe then thoroughly rinse off with approved soapy water solution.
3. Wrap pipe with cotton rags or burlap sacks soaked in a conductive anti-static liquid or a dilute soap and water solution.
2. Wrap starting at the trench wall inward along the pipe on both sides of the repair to be made toward the work area providing a path for the static charge to ground.
4. Be certain rags touch the ground with 4"-6" slack. Pour soapy water solution over rags, being sure to saturate them and pool soapy water solution on ground where rags contact ground.
5. Install jumper cables on tracing wire to be cut and spliced.
6. Install jumper cables on all metallic tools being used.

***Note: A soapy solution can be made by mixing 8-12 ounces of leak test soap with one (1) gallon of water.**

B. Steel or other Metallic Pipe: The use of ground cables and ground rods or plates shall be utilized as a precaution against static spark.

1. Before any pipe or tools are installed or removed place ground straps, insulated wire, or other approved device on each tool, pipe, or pipeline facility that is separated or may be separated. Ensure that each surface is clean and that cables make adequate connection.
2. Ground rods or plates shall be securely placed in the ground as to provide an adequate path for the static electricity and as not to be disturbed during the performance of the work.
3. Ground cables shall remain in place throughout the entire work performance.
4. Use of brass tools will reduce the chance of creating an accidental spark.

6.4 SMOKING

Smoking shall be carefully restricted to safe distances (220 feet or greater) from work areas. Under the following circumstances, no employee shall smoke nor allow anyone else to smoke in the restricted area.

1. When any job is in progress that will allow gas to escape.
2. When doing work in a vault where gas is under pressure.
3. When flammables, such as gasoline, diesel fuel or acetone might be present.
4. When "No Smoking" signs are posted, cigarettes, matches and lighters shall be

left at a safe distance.

Barricades, caution tape, and no smoking signs shall be utilized to define restricted area during the work performance.

6.5 COMBUSTIBLE ATMOSPHERE

Before entering areas where gas can accumulate, such as vaults and excavations that have been plated overnight test for the presence of combustible gases will be made with a combustible gas indicator (CGI).

Electric tools or fusion equipment may not be explosion-proof and may ignite a flammable gas atmosphere. **DO NOT operate electrical devices that are not explosion proof in a flammable gas atmosphere.**

6.6 PREVENTING AIR FROM ENTERING OPEN MAINS

Whenever possible, a main line shall not be open at two places at the same time, such as a blow-down or a cut in the line. This may permit a draft of air to enter the line at one opening and escape at the other, which allows the possible formation of an explosive mixture. This can be caused by wind pressure or by difference in elevation of the two openings, permitting air to enter the lower of the two openings. This must be guarded against, particularly when working large size mains. No main, service or other gas piping shall be cut apart without being properly grounded and purged by approved method.

One method of reducing the risk of air from entering a mainline is to cover the opening with a canvas tarp of other fire resistant material while preparing to make repairs.

PROCEDURES
LOCKOUT - TAGOUT

7.0 PURPOSE

Lockout-Tagout procedures are essential for the safety of Operator personnel and the general public. Lockout-Tagout procedures shall be adhered to whenever the unintended use of any tool and piece of equipment may cause harm to others.

7.1 SCOPE

A. Devices

B. Procedures

7.2 LOCKOUT - TAGOUT DEVICES

A. Lockout devices such as warning tags, padlocks and keys shall be:

1. Individually identified and assigned to authorized individuals
2. Marked in such a way (e.g., number, name, color, etc.,) to identify the user.
3. Separately keyed to preclude unauthorized removal.
4. Standardized by size, shape, color, etc.

B. Tagout devices shall only be used when the energy isolating device cannot, because of design, be locked out.

C. Tagout devices, like lockout devices, may be removed from the energy isolating device only by the person who attached it.

D. Tagout devices must be placed on the energy isolating device at the same point where a lock would be placed. (If such unattachment point is not available, the tag must be placed in a position that is immediately obvious to anyone attempting to operate the energy isolating device.)

E. When a single lock or tag is used for a crew of employees performing service or maintenance on a single machine or piece of equipment, one employee must be assigned the responsibility of placing and removing the lock or tag. (The assigned employee must coordinate the shutdown and start-up procedures.)

7.2 LOCKOUT-TAGOUT PROCEDURES

A. The purpose of this procedure is to establish requirements for the lockout or tagout of energy isolation devices (valves, switches, etc.). These requirements are intended to ensure that any machine, equipment, pipeline or other facilities on which work is being performed has been effectively isolated from all potentially hazardous release of energy thus preventing an unexpected activation or re-energization of the machine, equipment, pipeline or other facility that could result in an employee injury.

B. This procedure covers the following activities involving energized or pressurized equipment:

1. Installation
2. Setup (Pre-operation Preparation)
3. Inspection
4. Modification
5. Maintenance/Service

C. This procedure <u>does</u> <u>not</u> <u>apply</u> to the following activities:

1. Work on cord or plug connected to electrical equipment when the cord is unplugged and under the exclusive control of the employee performing the work.
2. Hot tap operations on pressurized pipelines for which specific, written operator procedures are currently established and adhered to.

D. <u>Examples of Lockout/Tagout Usage</u>

1. Pipeline repairs involving isolation of the pipe from pressurized systems when valves, stoppers or squeezers are not in the immediate vicinity of the work location.
2. Maintenance on regulating or measurement stations isolated or on bypass.

E. When encountering situations similar to the above mentioned examples, the Lockout/Tagout Procedure will be implemented as follows:

PROCEDURES
LOCKOUT - TAGOUT

1. Locate and identify all valves, switches, etc. that will be used as isolation points.
2. Inform all employees involved of the isolation plan.
3. One person shall be responsible for the placement and removal of <u>all</u> locks or tags used on the particular work activity. The responsible person will maintain sole possession of the key(s) while work is in progress.
4. The responsible party will ensure all personnel are safely positioned and work is satisfactorily completed before removing locks/tags and begin re-energization.

PROCEDURES
TRENCH SAFETY

8.0 PURPOSE

Excavations performed by Operator personnel our others present potential hazards. The following Best Excavation Practices shall be adhered to whenever excavation is to take place on or around the gas system:

8.1 SCOPE

A. Competent Person

B. Excavation Exit & Entry

C. De-Watering

D. Adjacent Structures

E. Placement of Spoils

F. Shoring & Sloping

G. Pavement Cutting

8.2 GENERAL

A. The operator/contractor shall be responsible to mark planned excavation area and call the appropriate **One-Call System**. Appropriate time shall be allowed for applicable locates to take place before any excavation begins.

B. The company/contractor shall remove all foreign water entering the trench. **Refer to Section E-10**

C. All excavations shall be clearly marked with barricades / cones / caution tape to protect the general public and keep unauthorized individuals from entering work site.

8.3 TRENCH INSPECTION

An OSHA approved competent person (i.e., Supervisor, Crew Leader or other appropriately trained employee assigned by the Operator) shall personally inspect any trench or excavation for cave-in potential, hazardous atmosphere and condition of shoring (when used) prior to anyone entering. Daily inspections shall be made on excavations or trenches left open overnight. Periodic inspections are required on excavations or trenches exposed to wet conditions from running water, ground water or rain. Employees may not enter a trench or excavation if during the inspection, it is found to be unsafe.

8.4 ENTRY-EXIT

A ladder, stairway or sloped ramp shall be used for entering and exiting all trenches 4' or more in depth. Travel distance to the way of exit shall not exceed 25'. Ladders shall be in good condition and shall extend 3 rungs above the top of the trench. A ramp used for entering or exiting the trench must be sloped so as to allow an employee to walk upright when using it.

8.5 FOREIGN TRENCH

Entry into a non-complying foreign (excavation dug by others) trench or excavation is prohibited until the excavation has been properly sloped or a protective system (shoring, trench box) has been provided.

8.6 UNATTENDED EXCAVATIONS

Excavations and trenches that are unattended or remotely located from the actual work site shall be covered or barricaded to protect the public.

8.7 WATER IN TRENCHES

Employees shall not work in trenches or excavations in which there is an accumulation of water unless adequate precautions have been taken to protect against hazards posed by the water. Diversion ditches, dikes or other suitable means shall be taken to prevent water from entering a trench or excavation and to provide adequate drainage next to the excavation. The Competent Person shall periodically monitor water removal equipment to ensure proper operation. **Refer to Section E-10.8, Dewatering**

8.8 PLACEMENT OF SPOILS

Spoils shall be placed a minimum of 2' from the edge of the trench or excavation or effectively retained so that employees in the excavation will not be exposed to falling or rolling objects. When hand excavating, a safe distance between employees in the excavation shall be maintained to avoid injuring a fellow employee with shovel, digging bars, appropriate hand excavation tools, etc.

8.9 ADJACENT STRUCTURES

When the stability of adjoining buildings, walls or other structures is endangered by an excavation, shoring, bracing, underpinning or other effective means shall be used to protect against a collapse.

8.10 SHORING AND SLOPING

Soil classification is an important part of the proper sloping or shoring technique used. Three soil types are recognized in addition to stable rock. They are listed below in decreasing order of stability:

A. Type "A" (most stable) soil means cohesive soils with an unconfined compressive strength of 1.5 tsf (ton per square foot) or greater. Examples of cohesive soils are clay, silty clay, sandy clay, clay loam and in some cases, silty clay loam and sandy clay loam, as well as cemented soil such as caliche and hardpan. However, no soil is Type A if it is:

1. Fissured.
2. Subject to vibration.
3. Previously disturbed or is part of a sloped, layered system where layers dip into the excavation or a slope of four horizontal to one vertical or greater.
4. Subject to other factors that would require it to be classified as a less stable material.
5. Trench slope may be from ½:1 or ¾:1 or benched to same slope.

B. Type "B" (less stable) soil means cohesive soil with an unconfined compressive strength greater than 0.5 tsf, but less than 1.5 tsf, or:

1. Granular noncohesive soils including angular grave, silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
2. Previously disturbed soils, except those that would otherwise be classified as Type C soil.
3. Soil that meets the unconfined compressive strength or cementation required

for Type A, but is fissured or subject to vibration.

4. Dry rock that is not stable.
5. Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.
6. Trench slope 1:1 or benched to same slope.

C. "Type C" (least stable) means cohesive soil with an unconfined compressive strength of 0.5 tsf or less, or:

1. Granular soils including gravel, sand, loamy sand.
2. Submerged soil or soil from which water is freely seeping.
3. Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.
4. Trench slope may be from 1½:1 or benched to same slope.

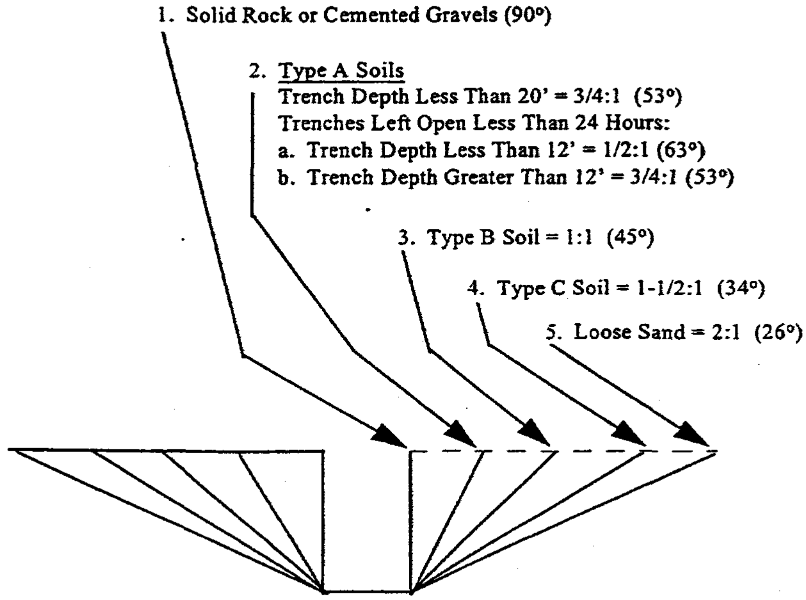
D. At least one visual and one manual test must be conducted by the "competent person" to determine the appropriate soil classification during excavation

E. Shoring and Sloping Requirements - General

1. Banks more than 5' high shall be shored, sloped back to stable slope, or some other equivalent means of protection shall be provided where employees may be exposed to moving ground or cave-ins.
2. Trenches located in stable rock do not require shoring or sloping.
3. Sides of trenches in unstable or soft material, 5' or more in depth, shall be shored, sheeted, braced, sloped, benched, or otherwise supported by means of sufficient strength to protect the employee working within them.
4. Trenches less than 5' in depth shall also be effectively protected when examination of ground indicates that there may be unstable ground.
5. Materials used for sheeting, bracing, shoring and underpinning shall be in good serviceable condition, and timbers used shall be sound and free from large or loose knots, and shall be designed and installed so as to be effective to the bottom of the excavation.

FIGURE 1

ANGLE OF REPOSE FOR SLOPING EXCAVATIONS



Note **Sloping or benching for excavations greater than 20' must be designed by the Engineer.**

Sloping requirements are to be determined by qualified "competent person".

Contractor-installed shoring or sloping must comply with minimum Operator /OSHA requirements. Soil classification is an important part of the proper sloping or shoring technique used.

8.9 FOREIGN LINES (UNDERGROUND)

A. Before any excavation is started, all available means shall be used to detect foreign lines such as telephone, water, underground electric power lines, etc. Appropriate and applicable one-call systems, shall be notified allowing for appropriate advance notification of any excavation.

B. The location of existing underground utility lines shall be plainly marked and the excavator informed so he can take steps to avoid them. Pneumatic tools or any other tools having a metal handle shall not be used to uncover cables or conduits carrying high voltage.

Note: Color following color codes are used to indicate existing facilities:

Red	**Electric**
Orange	**Telephone and Cable TV**
Yellow	**Gas**
Green	**Sewer**
Blue	**Water**
White	**Proposed Excavation**

C. When using booms or excavating equipment under or near overhead power lines, where there is a possibility of touching the line, the following boom clearance shall be maintained:

1. For lines 50KV or less, ten feet (10').
2. For lines over 50 KV, ten feet (10') plus 0.4 inches for each 1 KV over 50 KV.

D. The electric utility shall be contacted for instructions when the voltage is unknown.

E. Exposing foreign lines shall be done manually rather than with machine. Digging tools with non-metallic handles shall be used. Follow local requirements for the distance that hand excavation is required around a facility.

8.10 PAVEMENT CUTTING

A. All work done in connection with pavement cutting and excavation shall be done with the standard specifications of the state, city, county or other authority involved

B. When engaged in pavement cutting, foot guards, goggles or safety glasses, and ear protection must be worn.

C. Edges of cuts shall be left square and as free from jagged edges as possible in order to prevent hazardous working conditions.

D The practice of undermining pavement and then breaking it down is prohibited.

PROCEDURES
PIPELINE SECURITY / CONTINUING SURVEILLANCE

9.0 PURPOSE

All gas utility personnel share in the responsibility to protect the Operators system security and safety. As well as the potential for accidental interruption of service and public safety, the potential for intentional acts of sabotage exists.

9.1 SCOPE

A. Pipeline Safety

B. Continuing Surveillance

B. System Security

9.2 PIPELINE SECURITY

A. Threats to pipeline safety may be facilities damaged due to force masseur including but not limited to:
- Vandalism and/or sabotage
- Rock fall or slide
- Snow slide
- Soil Liquefaction
- Lateral spread
- Earthquake

B. The operator's specific plans for system safety shall include:
- Identifying sensitive pipeline facilities
- Develop plans to keep these facilities safe from vandalism or intended acts of sabotage.

C. **Particular attention should be given to Critical infrastructure with:**
- Potential as a terrorist target
- Potential to be used as a weapon
- Potential for mass casualties
- Potential affects to drinking water supplies
- Military/defense installations

D. All Operator personnel shall be trained and the general public informed about public awareness and their role in:

- Being on the lookout during regular activities for any suspicious activity on or around gas pipeline facilities.
- Double check, and verify that gas facilities that require locking devices are properly locked. Also check for evidence of tampering.
- Be especially aware of any unusual findings, evidence of tampering or valves in the wrong position during maintenance activities.

E. Attention shall be given to cyber threats as well as physical ones

F. Immediately report suspicious activities to the gas supervisor or appropriate authorities

G. Should such events occur, a leakage survey should be conducted to ensure pipeline safety

Refer to Emergency Response Plan Section 2.8, Civil Disorder / Natural Disaster Guidelines for additional information.

9.3 <u>CONTINUING SURVEILLANCE (192.603)</u>

Each utility employee shall have the responsibility to report any observed changing conditions that may affect the safe operation of the gas system as may be observed during the normal performance of their daily activities. These include but are not limited to:

- Leakage conditions
- Exposed lines or suspected ground movement
- Corrosion
- Material or equipment failures
- Tampering or encroachment
- Any changes that may affect class locations
- Any construction, excavation, or blasting activities that may adversely affect the system
- Confirmation and/or revision of MAOP

Such conditions shall be reported to the appropriate management personnel as soon as practical. All observations of this nature shall be documented and

turned into the appropriate utility management individual for appropriate remedial action.

PROCEDURES
SHUT-DOWN / START-UP

10.0 PURPOSE (192.605)

The purpose of this section is to establish that whenever the need arises, planned or unplanned, to shutdown a segment of the pipeline system, it is necessary to establish a specific plan for the safe shutdown and start up.

Potential Causes
- Emergency Situation
- Planned Maintenance, Repair, or Replacement
- New Facilities Extension

10.1 SCOPE

A. Emergency Shutdown

B. Planned Shutdown

C. Start-up

10.2 EMERGENCY SHUTDOWN

A. Incident or Uncontrolled Escape of Gas
1. Implement Emergency Response Plan (ERP) to protect the general public
    a. Secure the area involved
    b. Assess the situation and implement ERP as necessary
    c. Identify pipeline segment(s) involved
    d. Determine if pipeline shutdown or pressure reduction is appropriate
    e. Identify points to install gauges and to monitor pressure
    f. Establish emergency command center
2. Take action to shut down gas flow or reduce pressure
3. Control the flow of gas by
    - Squeeze off
    - Isolation Valves
    - Line fittings
    - Reduce pressure at pressure reducing station
4. Be observant of potential abnormal operating conditions
5. Complete safe repair or replacement of affected facilities

6. Document your actions; Complete all appropriate Operator forms

10.3 PLANNED SHUTDOWN

A. Prepare written plan of action
   1. Monitor upstream and downstream pressures
   2. Isolate gas supply or reduce pressure
      - Valve(s)
      - Line stop fitting(s)
      - Squeeze
      - By-pass
      - Pressure reducing station(s)
   3. Isolate / Turn off all affected customer meters. (Use Gas Outage Control Form)
   4. Be observant of potential abnormal operating conditions
   5. Complete safe repair or replacement of affected facilities

B. Complete appropriate documentation

10.4 START UP

A. Plan for the safe reintroduction of gas into the system

B. Be observant of abnormal operating conditions

C. Purge the system of air and foreign material **Refer to Section H – 5**

D. Plan for safe customer relight(s) **Refer to Section F – 4**

PROCEDURES
ABNORMAL OPERATING CONDITIONS (AOC)

11.0 PURPOSE

The purpose of this section is to identify a comprehensive list of Abnormal Operating Conditions (AOCs). This list will never be all inclusive.

11.1 SCOPE

A. AOCs

B. Recognize and React Appropriately

11.2 ABNORMAL OPERATING CONDITIONS (AOC)

An Abnormal Operating Conditions (AOC) is a condition identified by the Operator that **may** indicate a malfunction of a component or a deviation from normal operations that **may**:

a. Indicate a condition exceeding design limits; or
b. Result in a hazard to persons, property or the environment

Any condition that is other than normal (within the normal design parameters for the pipeline and pipeline facilities) is therefore abnormal. Any condition that is found to be abnormal and is not an incident is an AOC. AOCs include but are not limited to the following:

System pressure deviation – high or low
Unanticipated system flow rate
Unplanned or uncontrolled release of gas
Activation of a pressure relief or other over pressure protection device
Insufficient cover or exposed pipe
Damaged, defective, or deteriorated pipe, pipe coating, or component
Component failure or malfunction
Odorant levels – to high or to low
CP readings – to high or to low
Key valves – obstructed, in the wrong position or inoperable
Unauthorized excavation or blasting near gas facilities
Construction defect
Unsafe meter set

PROCEDURES
ABNORMAL OPERATING CONDITIONS (AOC)

11.3 RECOGNIZE AND REACT AND RESOLVE

Each individual, employee or contractor, that performs a covered task on the Operator's system shall demonstrate his/her knowledge, skill, and ability to recognize and react appropriately to any abnormal operating condition that may arise during the performance of that task.

AOCs will be identified as either a hazard, poses an immediate threat to public safety, or potentially hazardous, a condition that if not corrected may become a hazard. The following matrices, #1 for employees, and #2 for contractors, shall be followed when encountering an AOC.

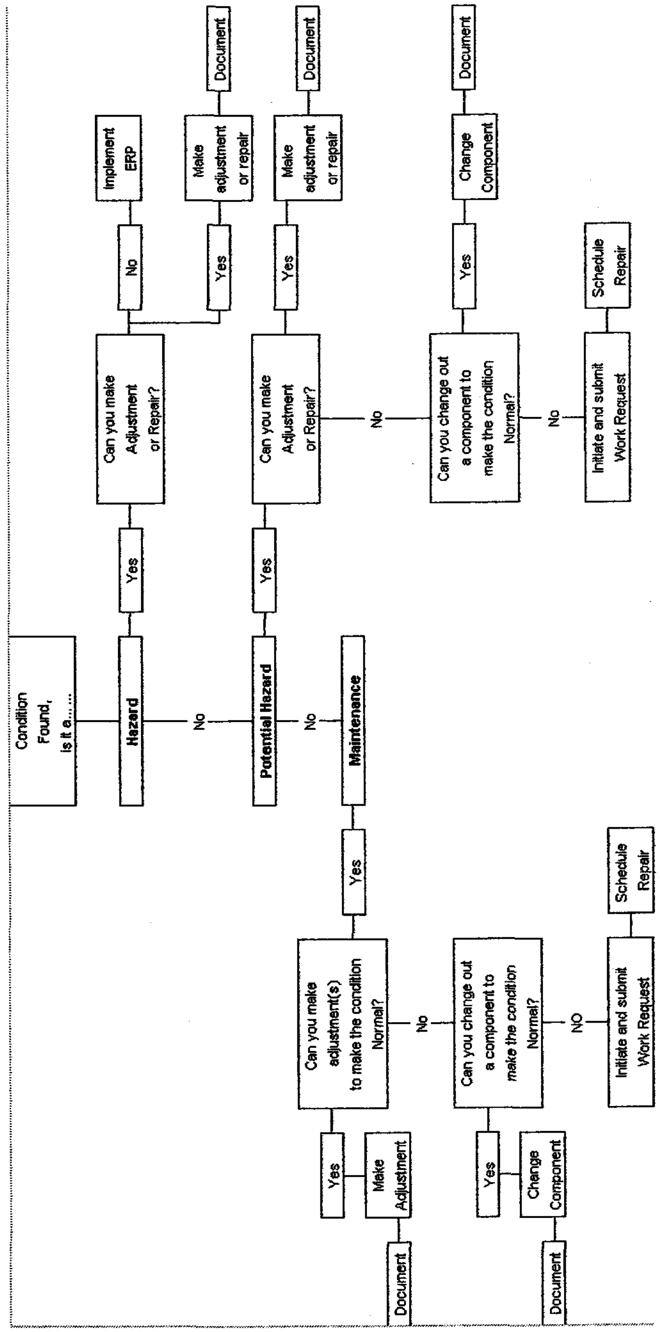
Hazardous AOCs require immediate and continuous action to correct.

Potentially Hazardous AOCs shall be tracked utilizing appropriate operator forms. The potentially hazardous condition shall be corrected within 120 days. If it can not be corrected within that time the operator shall develop a written plan of action to correct the condition.

PROCEDURES

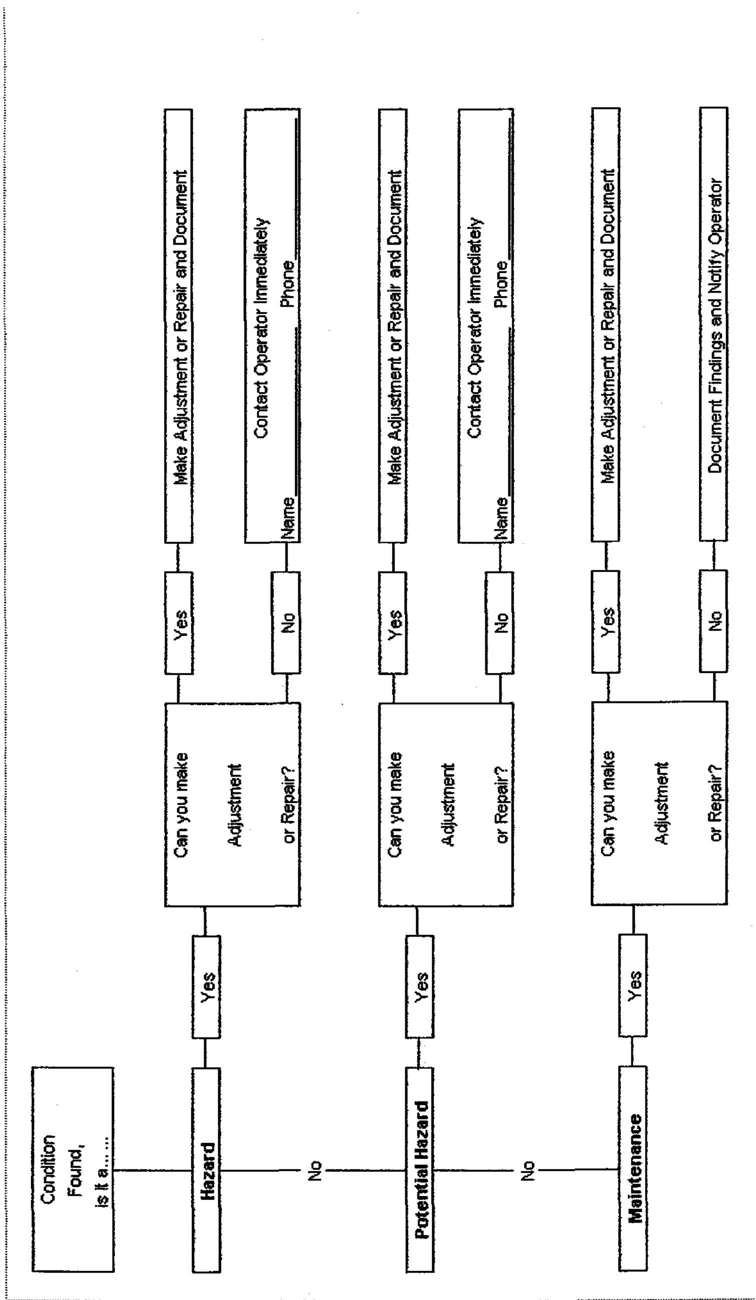
ABNORMAL OPERATING CONDITIONS (AOC)

OPERATOR
ABNORMAL OPERATING CONDITIONS MATRIX #1



PROCEDURES
ABNORMAL OPERATING CONDITIONS (AOC)

CONTRACTOR
ABNORMAL OPERATING CONDITIONS MATRIX #2



PROCEDURES
SYSTEM INTEGRITY

12.0 PURPOSE

The U.S. Legislature enacted legislation during 2002 that directly impacts the pipeline industry. The Integrity Management Program, currently affecting **Transmission Pipelines**, containing the following elements may be found under separate cover.

1. Integrity Management Plan
2. Performance Plan
3. Communication Plan
4. Management of Change Plan
5. Quality Control Plan

This section identifies current elements of the Operator's **Distribution System** procedures in a way to address pipeline integrity and future requirements.

12.1 SCOPE

A. Class Location Study

B. Patrolling

C. Safety Related Conditions

D. Failure Investigation

E. Operator Qualifications

F. System Design

G. Records and Reports

H. Annual System Review

I. Annual Report

12.2 CLASS LOCATION STUDY (192.609 & 192.611)

The Operator shall at least once each calendar year conduct a **Class Location Study** to evaluate the affects of population growth and new construction within the area of its pipeline facilities to determine the need if any for changes in Class Location. Whenever an increase in population density indicates a change in class location, the operator shall perform a study to determine if the current MAOP remains valid or should be changed.

This Class Location Study shall include, but not be limited to the following:

1. Sliding Mile - 220 yards on either side of the pipeline by 1 mile long along the centerline of a pipeline where the pipeline is continuous through the 1 mile. The concept here is not one of blocks of land each fixed to a particular point on the ground, but rather that of a "window" which can be moved along the pipeline as an aid in analyzing building and therefore population density and the related safety liability or a "Sliding Mile".
2. Evaluate the effects of new construction and development
3. Evaluate the effect of changes in population growth
4. Define and document all class locations in accordance with the findings of the study

The four class locations are:

Class 1: Class location unit contains fewer than 10 buildings intended for human habitation.

Class 2: Class location unit contains more than 10 but fewer than 46 buildings intended for human habitation.

Class 3: Class location unit contains more than 46 buildings intended for human habitation. A class 3 location also exists where, the pipeline lies within 100 yards, 300 linear feet, of a building occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12 month period.

Examples of class 3 locations include but shall not limited to:

- Businesses
- Schools and churches
- Meeting halls and convention facilities
- A small, well defined, outside area, such as a park
- A school bus stop located within 100 yards of the pipeline where 20 or more children wait for the bus
- A prison or other facility that may be difficult to evacuate

Class 4: Class location unit contains a prevalence (50% or greater) of buildings of four or more stories above ground. For this definition, each dwelling unit in a multiple dwelling complex is counted separately. When a cluster of buildings requires a class 2 or 3 location, the class location ends 220 yards from the nearest building in the cluster.

12.3 PATROLLING:

The Operator shall establish a program to identify and observe its system facilities in locations where anticipated physical movement or external loadings could cause failure. These locations include, but shall not be limited to the following:

1. River crossings, both suspended and buried
2. Known fault lines
3. Railroad and highway crossings
4. Locations of known shallow depth
5. Any area where it may reasonably be expected that outside forces may have influenced the potential for movement

Facilities shall be observed for:

1. Exposed Pipe
2. Damage or Failure
3. Hazardous conditions
4. Safety Related Conditions
5. Increased potential for damage
6. Vandalism

All such areas shall be checked immediately following one of, but not limited to, the following events:

1. Earthquake
2. Major flooding
3. Land and/or snow slide
4. Tsunami

(192.705 Transmission)
At required frequencies, observe conditions on and adjacent to its transmission facilities for leaks, construction activities and other factor affecting the safety and operation.

1. Class locations 1 & 2: At highways and railroad crossings, interval not greater than 7 ½ months but at least twice each calendar year. At all other locations, at intervals not

greater than 15 months but at least once each calendar year.
2. Class location 3: At highways and railroad crossings, interval not greater than 4 ½ months but at least four times each calendar year. At all other locations, at intervals not greater than 7 1/2 months but at leas twice each calendar year.
3. Class location 4: At all known locations, interval not greater than 4 ½ months but at least four times each calendar year.

(192.721 Distribution)
1. In business districts, intervals not exceeding 4 ½ months but at least four times each year.
2. Outside business districts, intervals not exceeding 7 ½ months but at least twice each year.

12.4 SAFETY RELATED CONDITION: (191.23 & 191.25)

Operators are required to take corrective action and report certain safety related conditions.

A. Training of Employees: Employees shall receive instruction in identifying and reacting appropriately when safety related conditions are discovered.

B. Recognizing and Reacting to Safety Related Conditions:

Examples:
1. Impaired Structural Integrity or Serviceability of a Pipeline. Employees are on the watch for the following: Any shifting or abnormal loading by environmental causes such as earthquake, landslide, flood, or similar natural causes which may impair the serviceability of any part of the system. When any such event occurs, the Operator inspects the entire system at the earliest possible moment to determine if the system has sustained any damage.
2. System Malfunction or Operator Error. Any system malfunction or Operator error which causes the operating pressure to rise above the sum of the MAOP plus the allowable build-up pressure for operation of pressure limiting or control devices
3. Situation which could lead to an imminent hazardous and cause, directly or indirectly, a reduction of 20% or more in the operating pressure, or in system shutdown.

Instructions for Rectifying Safety Related Conditions:
1. Should the Operator rectify the potential safety related conditions in accordance with its established repair procedures within five (5) days of discovery of the safety related condition, no report is required.
2. Other condition not reportable:

- Should the condition be determined not to actually exist.
- Should it becomes an incident prior to the deadline for filing the safety related condition report.
- Should it exist on a pipeline that is more than 220 yards from a building intended for human occupancy or an outdoor place intended for public assembly, except that a report is still required if the condition is within the right-of-way of an active railroad or paved road, street, or highway.
- Should the Operator not rectify the safety related condition within five (5) working days of discovery then:
- Safety related conditions are reported to the Secretary of the U. S. Department of Transportation by means of a Safety Related Condition Report.
- This report shall be filed with the Secretary within 10 days of the discovery of an alleged condition and within 5 days of the determination of the existence of the condition. In determining the number of days, exclude Saturdays, Sundays or Federal holidays.
- The report contains the following information:
    - Operator's name and address
    - The date
    - Name, job title, and business telephone number of the person who determined (verified) that the condition exists
    - The dates when the condition was discovered and when its actual existence was verified
    - Location of the condition with reference to a specific geographical area (give state, county and town or city, nearest street address, survey station number, milepost, fixed landmark, etc.);
    - Description of the condition including how it was discovered, what effect it may have on safety, and what is carried in the pipeline;
    - What corrective action has been or will be taken, together with a plan and a schedule showing when the future action will be initiated and concluded.

The Addressee for this and all other reports to DOT is:

Information Resources Manager
Office of Pipeline Safety
Research and Special Programs Administration
U. S. Department of Transportation, Room 2335

400 Seventh Street, SW
Washington, D. C. 20590

The report may effectively be filed by FAX; the number for this is (202) 366-7128.

12.5 FAILURE INVESTIGATION: (192.617)

Each accident or failure involving the operator's system which, results in an emergency situation, shall be investigated to determine the cause of the failure and to minimize the possibility of a recurrence. The following may be included:

1. Question witnesses
2. Check condition of facilities including meters and regulators
3. Test odorant level
4. Evaluate damage patterns
5. Evaluate potential of weather conditions or other outside forces having contributed to the situation
6. Maintain adequate samples of failed or damaged facilities to perform further materials tests
7. Solicit outside assistance with investigation when appropriate
8. Review records of previous work and operator or contractor personnel's performance as may have contributed to the accident or failure

The operator shall report accidents or failures that result in an emergency situation in accordance with applicable State and Federal requirements.

12.6 OPERATOR QUALIFICATIONS (192.801- 192.805)

The Operator is responsible to ensure that all Operator personnel and contract personnel are qualified to perform Covered Tasks involving the operation and maintenance of the Operator's natural gas system and are able to recognize and react appropriately to any abnormal operating conditions which may arise during the performance of the Covered Task. Each individual must demonstrate the knowledge, skill, and ability to perform a covered task.

(Written Operator Qualification Program under separate binder)

12.7 SYSTEM DESIGN: (192.53, 192.103 & 192.143)

All materials, pipe, and components shall be designed in accordance with the requirements established under Subparts B, C & D of this Part.

12.8 RECORDS, REPORTS AND MAPS: (192.603)

The operator shall maintain documentation as required by rule and make this documentation available as may be necessary for the safe operations and maintenance of its system. It is the position of the State and Federal regulators that **"If it is not documented then it is not considered completed"**. These may include but are not limited to the following:

A. Maps depicting size, type and location of mains, services and other pipeline facilities.
B. Pressure test records shall be maintained for the useful life of the pipeline facilities.
C. Records and reports of all annual maintenance requirements as prescribed by rule.

Refer to Section E-1

12.9 ANNUAL SYSTEM REVIEW: (192.605)

The Operator shall institute a program for the annual review of its system including this manual (at an interval not exceeding 15 months but at least once each calendar year). The following, but not limited to, may include:

A. System inspection of records and site inspections to ensure critical and urgent O&M requirements have been met. The following records shall be included:
   1. Leak survey records
   2. Corrosion control reports
   3. Maintenance records
   4. Failure reports
   5. Line locations & damage reports
   6. Patrolling records

B. Review meeting with operations personnel to discuss system compliance conditions, pertinent changes to Parts 191 and 192 and state regulations,
   1 Continuing surveillance findings
   2 Class Location Study including population growth, system changes and other information that may affect current class location determinations **(192.609 & 192.611)**

3 Safety Related Conditions
4 Design records
5 All other pertinent information that may affect the natural gas system operations.

12.10 ANNUAL REPORT: (191.11, 191.13 & 191.17)

On or before March 15th of each colander year, the operator shall complete and file form RSPA 7100.1-1 with the DOT at:

Information Resource Manager
Office of Pipeline Safety
Research and Special Programs Administration
US Department of Transportation, Room 2335
400 Seventh Street SW
Washington D. C. 20590

File a copy with the appropriate state regulator(s) as may be applicable. The applicable State Pipeline Safety office may require that this report be sent to them earlier than March 15th.

12.13 QUALITY ASSURANCE

A. The Operator conducts periodic review and inspection of work performed by its personnel to determine the effectiveness and adequacy of its procedures. If deficiencies are found in its procedures, the Operator will modify them as necessary.

B. All records and reports produced in the field shall be signed by the qualified individual performing the work as well as to be reviewed by the appropriate supervisor prior to filing.
   1. Documentation shall be checked for completeness
   2. Proper procedures
   3. Safety compliance
   4. Any abnormal operating conditions

C. Quality Control Inspections are conducted on a Quarterly basis not to exceed three and one half (3-1/2), months for each employee and contract employee performing work on the Operator's system.

D. The Operator contracts with one or more suitable, qualified consultants to provide training for its employees and for those of consultants and contractors as may be needed.

1. The operator has developed a Training Matrix for identifying and scheduling necessary training.
2. The requirements for refresher training for existing employees may be satisfied by demonstration of continued competence by the employee.

Note: Operator Qualification Program under separate cover.

PROCEDURES

PUBLIC AWARENESS and DAMAGE PREVENTION

13.0 PURPOSE

The purpose of this section is to define the Operator's program directed at raising the affected public's awareness of the presence of the gas pipeline facilities in their community and to understand the steps that should be taken to prevent and to respond to potential pipeline emergencies.

The program goal is to eliminate damages and the uncontrolled release of gas from its system which may adversely affect the safety of the general public.

13.1 SCOPE

Public awareness is an essential ingredient in the overall pipeline integrity and safety. This program is intended to enhance the part that the public plays in the prevention of and response to potential pipeline emergencies. Included are the following program guidelines:

A. Public Awareness

B. Damage Prevention

13.2 PUBLIC AWARENESS: (192.616)

The (*Title*) [redacted] is accountable for the development, monitoring, implementation, and documentation of the program for public awareness, however each gas utility employee and contract employee share in the responsibility to maintain a safe system.

Key stakeholders include:

- Landowners adjacent, within 330 linear feet, of the operator's rural pipeline route
- Residents and businesses within the local distribution system service area (Customers and non-customers)
- Places of congregation within service area or adjacent to the rural pipeline route (Bothe structures and outside gathering areas)
- Emergency response officials who may respond to an emergency effecting the Operator's system
- Local public officials
- Excavators known to perform excavation within the Operator's service area or advertising locally to do so, ie. phone book or other local publications

A. The Operator has establish the following methods for educating the public about the utility and about recognizing gas pipeline emergencies and reporting them to the Operator. These may include but are not limited to the following:

- Media advertisement i.e. newspaper(s), TV, radio and other information pieces shall occur at a minimum of twice annually
- Utility bill stuffers or bill messages shall contain public awareness message at a minimum of twice annually.
- Participation annually at the local events that may be well attended by local residents, business operators, and public officials.
- School education programs for students and educators shall be conducted annually.
- Direct mail to affected landowners, excavators, and others as may be necessary.
- Conduct annual public liaison sessions with emergency response agencies / first responders annually.

B. The Operator's Community Education programs will include but not be limited to the following messages:

- An odor, similar to that of "rotten eggs", is added to both natural gas and propane gas so that the smell is easily recognizable.
- Natural gas is a very safe form of energy but must be handled with care and respect. The safe and efficient operation of the natural gas system is a public concern.
- Incidents are rare but may occur including leaks, ruptures, and ignition
- Potential hazards may include construction or excavation near the gas facilities, land movement due to earthquakes, flooding, or landslides, and other events that may cause damage to the gas facilities.
- Other indications of a leak or rupture may include the sound of escaping gas, dust or other occurrences located near the gas facilities.
- Potential hazards should not be disregarded. The public should report to the utility any potential hazards they may see.
- Anyone who suspects that something is amiss with the system should immediately notify the utility.
- Inform the public that the utilities and their contractors are highly trained and qualified to recognize and react o any abnormal operating conditions that may occur.

C. At the time of customer sign up or transfer, customers should be notified of the above information plus:

- The utility owns and operates and maintains the gas facilities up to and including the service regulator and gas meter at or near the residence or structure.
- Only the utility's employees or contractors authorized and qualified by the utility may work on the gas facilities.
- The customer is responsible for maintaining the pipe from the meter to the individual gas appliances, including any buried pipe after the meter.
- Only qualified service persons should be utilized for making installations, repairs and/or alterations on the gas appliances or pipes after the meter.
- Pipeline warning signs are there for the public's safety and should not be damaged or removed.
- The customer may have installed and Excess Flow Valve at the time of installation or replacement of the gas service line.

D. The utility has established its Emergency Response Plan

- The utility regularly reviews and exercises this plan.
- Upon conclusion each incident, the actions of the individuals involved including those of outside responders and other that may have been involved are reviewed / debriefed.
- Any material failures, training needs, or necessary changes to the plan that are identified during this process are documented and addressed to the attention of the Manager of Gas Operations.
- Appropriate changes to the plan or procedures will be initiated by the Manager of Gas Operations.

E. Records of each of the above events shall be maintained in a central file location for review annually. These records shall be maintained for a minimum of three years or until the operator performs a regularly scheduled analysis of the effectiveness of the program

F. The Operator's Public Awareness Program shall be reviewed at a minimum of once annually at the time of the annual O&M Plan review.

G. From time to time, but not to exceed 3 years, the Operator will arrange to have conducted an audit of this program by a qualified individual or consultant, knowledgeable in the pipeline safety regulations and effective emergency response. Included will be:

- Documentation of actual messages and frequency
- A random survey of or meeting with key stakeholders
- Measurement of program effectiveness:
  - Reaching intended audience
  - Effectiveness of message, is the consumer aware
  - Reduction in actual incidents
  - Interview utility personnel
- Recommendations for change or enhancements

13.3 DAMAGE PREVENTION: (192.614)

The Operator has established a damage prevention program which is closely related to the Public Awareness Program, and is designed to eliminate damages to the Operator's gas system caused by third parties.

A. The primary ingredient is to participate in the local One Call System.
- The Operator shall maintain active participation in the local area **One Call System.**
- Appropriately respond and document all calls for line locations within allotted time established by the state's one call law.
- The Operator shall follow all rules and guidelines set down by state and local statutory requirements

B. Customer Notification at time of sign-up including the following:
- Excess Flow Valve
- "Call Before You Dig".
- One-Call System brochures and handouts
- Identify contractors and excavators know to perform excavation within the
- Pipeline markers and Warning signs

C. Identify and Inform Excavators and Contractors
- Annually, direct mail to each, notification of state law, line location services, and one call center phone number
- Phone book or other local publications shall be utilized in identifying the individuals, companies, and entities

PROCEDURES
PUBLIC AWARENESS and DAMAGE PREVENTION

D. The Operator shall place and warning signs wherever it is deemed necessary to reduce the possibility of damage to the Operator's facilities.
- Aboveground facilities in Class 1 & 2 Locations
- Railroad and public roadway crossings in Class 1 & 2 locations.
- Inform the public of the importance of these signs and that the pipeline warning signs are there for the public's safety and should not be damaged or removed.

E. The Operator shall place caution tape above all newly installed and replacement gas mains and services. **Refer to Section E-8**

F. Operator Continuing Surveillance Program **Section B-9.3**

G. At the time of the annual O&M Plan review, the Operator shall evaluate the effectiveness of this program and make changes/enhancements as may be necessary

H. Also Refer to **Section B-12**, **System Integrity**, for additional actions complementing this program.

PROCEDURES
PLASTIC PIPE / GENERAL

1.0 PURPOSE (192.271-192.287)

It is the purpose of this section to provide minimum requirements and information on the equipment, materials and methods utilized in the fabrication of plastic gas pipe and tubing.

1.1 SCOPE

This section deals only with polyethylene plastic pipe. This section covers the following:

A. Handling and care of polyethylene pipe

B. Joining of polyethylene pipe and related fittings

C. Risers used with polyethylene plastic pipe

D. Controlling gas flow in polyethylene plastic pipe

E. Repair of Polyethylene Pipe

F. Use of mechanical fittings on polyethylene pipe

G. Static Discharge / Pinholing

1.2 GENERAL

Polyethylene plastic pipe is currently the most commonly used plastic pipe throughout the gas industry. PVC, ABS, and some other pipe materials exist in gas operating systems however these materials are no longer recommended for use in new or replacement systems.

New plastic pipes, including PA 11, are still under development and review by the industry. Use of this pipe does currently require a written waver from the applicable State regulatory body.

Individuals performing plastic pipe joining including fusion, mechanical, or other means shall be qualified in the procedure to be utilized, or must be under the direct observation of a qualified individual. For this procedure this means in a direct line of site in order that the qualified individual may recognize any abnormal conditions and immediately intercede.

PROCEDURES
PLASTIC PIPE / GENERAL

1.3 JOINING (192.271 – 192.287)

A. This Section covers joining of polyethylene pipe only.

B. In heat fusion joining, mating surfaces are prepared, simultaneously melted with a hot-plate heater, the heater is removed and the melted surfaces pressed together and held under pressure. As the molten materials cool, they mix and fuse into a permanent, monolithic joint. Pipe fusion requires specific tools and equipment for the fusion type, size of pipe and fitting.

C. Individuals performing polyethylene pipe joining must be qualified in the procedure being utilized or directly observed by an individual that is qualified.

D. Pipe and fitting surfaces must be clean and properly prepared

E. Heating tool surfaces must be clean, undamaged and at the correct surface temperature

F. Plastic pipe shall be joined utilizing one of the following procedures specified in this Section C of this manual.

1.4 MARKING

A. Each joint in a plastic pipe system shall be marked to identify the qualified individual performing the procedure, using their designated unique identifier.

B. Care shall be exercised in marking the pipe joint as not to damage the pipe. The following are acceptable marking instruments:
- Sanford Sharpies
- Sanford "Gold Coat" slim tip metallic marker
- Sanford "Silver Coat" slim tip metallic marker

1.5 MAIN TEMPERATURE

DOT regulated gas applications in the United States; main pressure must be reduced for elevated temperature when the main temperature exceeds 100°F (38°C).

1.6 STATIC DISCHARE / PINHOLING

The buildup and discharge of static electricity inside and on the outside of plastic pipe is of significant concern and may lead to future pipeline integrity.

A. Pinholing may be the result of static discharge such as during purging, or

B. May be due to a material defect

C. Caution and continuing surveillance of the plastic distribution system for signs of possible pinholing and resulting leakage shall be maintained by the operator

PROCEDURES
PLASTIC PIPE HANDLING AND CARE

2.0 PURPOSE

Care not to damage the pipe should be taken in the handling and storage of PE pipe. PE pipe shall be covered to avoid exposure to ultraviolet rays.

2.1 SCOPE

A. Handling and Loading
B. Storage
C. Exposure
D. Contaminated Pipe
E. Cold Weather Fusion

2.2 HANDLING AND LOADING

A. Four inch (4") and larger pipe shall be loaded and unloaded by the use of a mechanical lifting device. Pipe straps should be utilized to protect against damage to the pipe

B. The pipe shall not be turned loose to roll down the skids. It shall also be properly supported to prevent dragging ends of the pipe on the ground.

2.3 STORAGE

A. Pipe and tubing should be stacked in straight rows and contained by upright stakes or racks so it will remain straight.
B. Pipe should not be stacked so high as to cause the bottom rows to become out-of-round due to excessive loading.
C. Pipe should be stored on wooden strips not less than 6" wide to prevent it from being damaged or becoming out of round.
D. Pipe should be stored so as to eliminate debris and other undesirable elements from entering the pipe.
E. Care should be taken when loading and unloading pipe to avoid cuts and punctures that occur when pushed or pulled over sharp projections.
F. Pipe should not be dropped or struck by objects.
G. Polyethylene pipe may be laid on the ground without pads or similar support where the terrain will not damage the pipe.
H. All piping and tubing shall be carefully inspected for cuts, gouges and deep scratches upon delivery. Harmful imperfections shall be noted for proper disposition. Small

imperfections may be cut out and destroyed while major damage or imperfections shall not be accepted and/or returned to the supplier.

2.4 EXPOSURE TO ULTRAVIOLET LIGHT

A. Plastic pipe shall not be subjected to unprotected outdoor exposure to ultraviolet light for longer than 2 years.

B. This applies to all pipe kept in storage and to all temporary piping installations.

2.5 LIQUID HYDROCARBON PERMEATION

A. When present, liquid hydrocarbons may permeate (solvate) polyethylene pipe. Liquid hydrocarbon permeation may occur when liquid hydrocarbons are present in the pipe, or where soil surrounding the pipe is contaminated with liquid hydrocarbons, or where liquid hydrocarbon condensates can form in gas pipelines. All types of liquid hydrocarbons (aromatic, paraffinic, etc.) have a similar effect, and the relative effect on different polyethylene pipe resins is essentially the same. Heat fusion joining to liquid hydrocarbon permeated pipes may result in a low strength joint.

CAUTION — Once polyethylene pipe has been permeated with liquid hydrocarbons, heat fusion or electrofusion joining is NOT recommended because liquid hydrocarbons will leach out during heating and contaminate the joint. Liquid hydrocarbon permeated polyethylene pipe should be joined using suitable mechanical connection methods.

B. Liquid hydrocarbon contamination is indicated by a rough, sandpaper-like, bubbly, or pockmarked surface when a fusion heating iron is removed from the pipe surface, and may be indicated by discoloration or by a hydrocarbon fuel odor.

2.6 FUSION IN COLD WEATHER

A. In cold weather, polyethylene becomes more sensitive to impact and less flexible. Use additional care in handling. When temperatures are very cold, avoid sharp impact such as dropping the pipe from moderate heights. Cold pipes will be harder to bend or uncoil. In inclement weather and especially in windy conditions, the fusion operation should be shielded to avoid precipitation or blowing snow and excessive heat loss from wind chill.

B. Remove all frost, ice, or snow from the OD and ID surfaces of areas to be fused. Surfaces must be clean and dry before fusing.

C. Polyethylene pipe and fittings will contract slightly in the cold. Most butt and saddle fusion equipment will accommodate the slightly reduced diameter of cold pipe. In socket fusion, it will be more difficult to fit a cold socket fitting on the heating tool socket face. One way to compensate is to warm socket fittings in the cab of the service truck before using them.

D. In some cases, socket fusion cold ring clamps may fit loosely on cold pipe. Using two cold ring clamps, set the first cold ring clamp to proper distance with the depth gauge. Shim around the pipe behind the clamp with tape, and place a second, backup cold ring clamp over the tape. The backup cold ring clamp prevents slippage, and the inner cold ring clamp allows the pipe to expand to normal dimensions when heated.

E. When fusing in cold weather, the time required to obtain the proper melt may increase.
   - *Maintain the specified heating tool surface temperature.* ***Do not increase heating tool surface temperature.***
   - *Do not apply pressure during zero pressure butt or saddle fusion heating steps.*
   - *Do not increase butt or saddle fusion joining pressure.*

F. In butt fusion, melt bead size determines heating time; so the procedure automatically compensates when cold pipe requires longer time to form the proper melt bead size.

G. For saddle fusion, establish the necessary cold weather heating time by making trial melt patterns in the field on non-pressurized, excess pipe that is at field temperature. Use the standard heating time plus additional heating time in 3-second increments until the proper melt pattern is established on the pipe. A clean wood board or heat shield ("flyswatter") should be used between the saddle fitting and the heater to avoid heating the fitting when making trial melt patterns. Use only the cold weather heating time required to obtain the proper melt. Avoid excessive heating time. Do not make saddle fusion trial melt patterns on pressurized pipe.

H. In cold weather socket fusion, it takes more time to push a cold socket fitting onto the male socket heater face so trials to develop a heating time for the fitting are not needed. For the pipe, establish the necessary heating time by making trial patterns on excess pipe that is at field temperature. Use the recommended heating time plus additional heating time in three-second increments until the proper melt pattern is established.

PROCEDURES
BUTT FUSION

3.0 PURPOSE

This section identifies the procedures for performing butt fusion of polyethylene pipe and the handling and care of the equipment utilized to perform butt fusions.

3.1 GENERAL

A. Butt fusion is used to make end-to-end joints between "butt" or plain end pipes and fittings that have the same outside diameter and like wall thickness

B. Fusion tools and equipment must be correct for the job, and in proper working order

C. Individuals performing polyethylene pipe joining must be qualified in the procedure being utilized or directly observed by an individual that is qualified.

D. Pipe and fitting surfaces must be clean and properly prepared

E. Heating tool surfaces must be clean, undamaged and at the correct surface temperature

F. Any connections to dissimilar material shall be made with approved electrofusion fittings, mechanical fitting or other approved coupling.

3.2 POLYETHYLENE BUTT FUSION PROCEDURE

A. **Before You Start:**

1. Inspect pipe lengths and fittings for unacceptable cuts, gouges, deep scratches or other deleterious defects. Damaged products shall not be used (cuts, gouges, or scrapes deeper than 10% of the pipe wall thickness).
2. Toe-in or necking down is normal at pipe ends, but may need to be removed for socket fusion, or butt fusion to fittings.
3. Remove surface damage at pipe ends that could compromise the joining surfaces or interfere with fusion tools or equipment.
4. Be sure all required tools and equipment are on site, in proper working order and fueled up.
5. The pipe and fitting surfaces where tools and equipment are fitted must be clean and dry. Use CLEAN, dry, non-synthetic (cotton) cloths or paper towels to remove dirt, snow, water and other contamination.

6. Shield heated fusion equipment and surfaces from inclement weather and winds. A temporary shelter over fusion equipment and the fusion operation may be required.
7. Relieve tension in the line before making connections.

When joining coiled pipe, making an s-curve between pipe coils can relieve tension. In some cases, it may be necessary to allow pipe to equalize to the temperature of its surroundings. Allow pulled-in pipes to relax for several hours to recover from tensile stresses.

8. Pipes must be correctly aligned before making connections.
9. Cuts of pipe sizes 2" or smaller may be made using a ratchet single blade style cutter, or a guillotine style cutter. Wheel type tubing or pipe cutters should be used on sizes greater than 2" in diameter.
10. All points on both heating tool surfaces where the heating tool surfaces will contact the pipe or fitting ends must be within the prescribed minimum and maximum temperatures and the maximum temperature difference between any two points on the heating tool fusion surfaces must not exceed 20°F (11°C) for equipment for pipe smaller than 18-in. (450 mm) diameter, or 35°F (19°C) for larger equipment. Heating tool surfaces must be clean.

C. **Procedure**

1. **Secure**: Clean the inside and outside of the component (pipe or fitting) ends by wiping with a clean, dry, lint-free cloth or paper towel. Remove all foreign matter. Align the components with the machine, place them in the clamps and then close the clamps. ***Do not force pipes into alignment against open fusion machine clamps.*** (When working with coiled pipe, if possible "S" the pipes on each side of the machine to compensate for coil curvature and make it easier to join.) Component ends should protrude past the clamps enough so that facing will be complete. Bring the ends together and check high-low alignment. Adjust alignment as necessary by tightening the high side down.
2. **Face**: Place the facing tool between the component ends, and face them to establish smooth, clean, parallel mating surfaces. Complete facing produces continuous circumferential shavings from both ends. Face until there is a minimal distance between the fixed and moveable clamps. Some machines have facing stops. If stops are present, face down to the stops. Remove the facing tool, and clear all shavings and pipe chips from the component ends. ***Do not touch the component ends with your hands after***

facing. Care must be exercised when removing the shavings to prevent contamination of the faced ends. **Do not touch ends of pipe with bare hands, or dirty, oily rag, or gloves.**

3. **Align**: Bring the component ends together, check alignment and check for slippage against fusion pressure. Look for complete contact all around both ends with no detectable gaps, and outside diameters in high-low alignment. If necessary, adjust the high side by tightening the high side clamp. Do not loosen the low side clamp because components may slip during fusion. Re-face if high-low alignment is adjusted.
   Caution: Over tightening the clamps may distort the pipe.
4. **Melt**: Verify that the heating tool is maintaining the correct temperature.

Minimum 400 degrees F – Maximum 450 degrees F.

When checking heater plate surfaces for proper temperature use only approved tempilsticks, approved infrared (IR) thermometer, or approved pyrometer on the face of the heater plate. Do not use tempilsticks on the plate area where the pipe will make contact. Clean surface area with a clean cotton cloth or wooden implement if surface area is dirty. **(NEVER use metal tools)** Do not use any synthetic material, which might melt when placed on the hot heater plate.

Place the heating tool between the component ends, and move the ends against the heating tool. The initial contact should be under moderate pressure to ensure full contact. Hold contact pressure *very briefly* then release pressure without breaking contact. Pressure must be reduced to contact pressure at the first indication of melt around the pipe ends. Hold the ends against the heating tool ***without force***. Beads of melted polyethylene will form against the heating tool at the component ends. When the proper melt bead size is formed, quickly separate the ends, and remove the heating tool.

During heating, the melt bead will expand out flush to the heating tool surface, or may curl slightly away from the surface. If the melt bead curls significantly away from the heating tool surface, unacceptable pressure during heating may be indicated.

Heater plate temperature shall be checked prior to each fusion to confirm that the proper temperature is obtained.

PROCEDURES
BUTT FUSION

Table 1 Approximate Melt Bead Size

Pipe Size	*Approximate Melt Bead Size*
1-1/4" and smaller (40 mm and smaller)	1/32" – 1/16" (1 – 2 mm)
Above 1-1/4" through 3" (above 40 mm through 90 mm)	About 1/16" (2 mm)
Above 3" through 8" (above 90 mm through 225 mm)	1/8" – 3/16" (3 – 5 mm)
Above 8" through 12" (above 225 mm through 315 mm)	3/16" – 1/4" (5 – 6 mm)
Above 12" through 24" (above 315 mm through 630 mm)	1/4" – 7/16" (6 – 11 mm)
Above 24" through 36" (above 630 mm through 915 mm)	About 7/16"
Above 36" through 54" (above 915 mm through 1300 mm)	About 9/16"

5. **Remove heater plate** after achieving proper melt bead:
   Retract the movable alignment clamp to pull the pipe away from the heater plate. Bump the heater plate away from the stationary pipe end and carefully remove the heater plate. If softened material adheres to the heater plate, discontinue the process and restart from step 1.

6. **Join:** Immediately after heating tool removal, *QUICKLY* inspect the melted ends, which should be flat, smooth, and completely melted. If the melt surfaces are acceptable, immediately and in a continuous motion, bring the ends together and apply the correct joining force. ***Do not slam. Apply enough joining force to roll both melt beads over to the pipe surface.***

   A concave melt surface is unacceptable; it indicates pressure during heating. Do not continue. Allow the component ends to cool and start over at Step 1.

   The correct joining force will form a double bead that is rolled over to the surface on both ends.

7. **Hold:** Hold joining force against the ends until the joint is cool. The joint is cool enough for *GENTLE* handling when the double bead is cool to the touch (By hand for at least 30 seconds). Cool for about 30-90 seconds per inch of pipe diameter. *Do not try to shorten cooling time by applying water, wet cloths or the like.*

   Avoid pulling, installation, pressure testing and rough handling for at least an additional 30 minutes.

Heavier wall thickness pipes require longer cooling times.

8. **Inspect:** Visually Inspect on both sides, the double bead should be well aligned, rolled over to the surface, uniformly rounded and consistent in size all around the joint, and be non-porous. The double bead width should be 2 to 2-1/2 times its height above the surface, and the v-groove depth between the beads should not be more than half the bead height. If the joint doesn't meet these requirements, cut it out and restart from Step 1.

   When butt fusing to molded fittings, the fitting side bead may have an irregular appearance. This is acceptable provided the pipe side bead is correct.

   It is not necessary for the internal bead to roll over to the inside surface of the pipe.

Table 2 Butt Fusion Bead Troubleshooting Guide

Observed	Condition Possible Cause
Excessive double bead width	Overheating; Excessive joining force
Double bead v-groove too deep	Excessive joining force: Insufficient heating; Pressure during heating
Flat top on bead	Excessive joining force; Overheating
Non-uniform bead size around pipe	Misalignment; Defective heating tool; Worn equipment; Incomplete facing
One bead larger than the other	Misalignment; Component slipped in clamp; Worn equipment; Defective heating tool; Incomplete facing; Dissimilar material – see note above
Beads too small	Insufficient heating; Insufficient joining force
Bead not rolled over to surface	*Shallow v-groove* – Insufficient heating & insufficient joining force; *Deep v-groove* – Insufficient heating & excessive joining force
Beads too large	Excessive heating time
Squared outer bead edge	Pressure during heating
Rough, sandpaper-like, bubbly, or Pockmarked melt bead surface	Hydrocarbon contamination

D. **McElroy No. 28 Fusion Machine**

1. Check and adjust hydraulic pressures per the manufacturer's manual and monograph.

2. Select and install appropriate clamping inserts for the pipe that is being fused (as required).

3. Set up Pipe supports and adjust height so the pipe is in line with the jaws. Load pipe into machine placing approximately 1" of pipe past the face of the jaws.

4. Position pipe into machine by swinging the facer into place. With the carriage control valve lever, move the carriage toward the fixed jaws, while watching the gap at each end of the facer rest buttons. When the pipe is in contact with the facer, this gap indicates the amount of material that will be trimmed from the pipe end. Assure sufficient material will be removed for a complete face off. Tighten the clamp knobs on the outside jaws. Hand tighten the inside clamp knobs.

5. Face the pipe by:
   (a) Move the carriage to the right.
   (b) Open the ball valve on the facer motor.
   (c) Assure the selector valve handle is up in the facing position.
   (d) Move the carriage control valve to the left.
   (e) If the facer stalls, adjust the facing pressure so the facer continues to cut.

   IMPORTANT: When facing heavy wall pipe, it may be necessary to increase the system pressure to 1000 psi.

   IMPORTANT: When drag pressure exceeds 300 psi it is necessary to move the carriage to the left bringing the pipe ends into contact with the facer before opening the facer valve.
   (f) Let the carriage bottom out on facer stops. Turn facer off. Move the carriage to the right so the facer can be removed.

6. Release the trigger lock, and swing the facer out to the storage position.

PROCEDURES
BUTT FUSION

7. Remove chips from pipe ends. Do not touch faced pipe ends.

8. Inspect both pipe ends for complete face off. If the face off is incomplete, repeat the steps 2, 3, &4 above.

9. Move carriage to the right to open a space large enough to insert the heater.

10. When checking heater plate surfaces for proper temperature use approved tempilstiks, approved infrared (IR) thermometer, or approved pyrometer on the face of the heater plate. Do not use tempilstiks on the plate area where the pipe will make contact. Clean surface area with a clean cotton cloth or wooden implement if surface area is dirty. (NEVER use metal tools) Do not use any synthetic material, which might melt when placed on the hot heater plate.

    NOTE: Heater plate temperature shall be checked prior to each fusion to confirm that the proper temperature is obtained.

    (Minimum 400 degrees F – Maximum 450 degrees F)

11. Move selector valve handle down to the heating position.

12. Insert heater between the pipe ends.

13. Hove the carriage to the left, bringing the heater into contact with both pipe ends. Move selector to center position.

14. After following the specified heating time, do the following:
    (a) Shift carriage control valve to neutral position.
    (b) Shift the selector valve to fusion position
    (c) Move the carriage to the right just enough to remove the heater.
    (d) Quickly remove the heater.
    (e) Quickly move the carriage to the left, bringing the pipe ends together under the recommended pressure.
    (f) Allow pipe to cool under pressure according to manufacturers recommendations. (Reference Plexco bulletin no. 101 and 105Y

for approximate times as these may vary due to weather conditions, and pipe diameters.)

(g) After the joint has cooled for the recommended time, shift the carriage control valve to the neutral position.

(h) Loosen all clamp knobs, and move carriage to the right far enough to open the jaw nearest the facer.

(i) Open the movable jaws.

(j) Open the fixed jaws.

(k) Raise the pipe using both the pipe lifts.

(l) Visually inspect the joint for uniform, non-porous, well-aligned double bead around its entire circumference. If the joint doesn't meet these requirements, cut it out and restart from Step 2. (Refer to Plexco Heat Fusion Qualification Guide for additional visual acceptance and rejection criteria for PE butt fusions)

E. **McElroy MiniMac.**

a. Select and install appropriate clamping inserts for the pipe that is being fused (as required).

b. Load pipe to be fused by cleaning the inside and outside of pipe ends that are to be fused. Open the upper jaws and insert pipe in each pair of jaws with applicable inserts installed. Let the ends of the pipe protrude about 1/2" past the face of the jaws.

c. Adjust the pipe for facing. Separate facers are required for each pipe size. Select the proper facer to use and place it between the pipe ends. Squeeze the Trigger just enough to bring the pipe ends up against the facer and adjust for face-off. Lightly snug clamp knobs, but do not over tighten.

IMPORTANT: Over tightening can flare the pipe ends, causing misalignment.

d. Face the pipe ends by rotating the facer in the direction that the arrows indicate, until it bottoms out against the inside of the jaws.

e. Check the alignment of the pipe by bringing the pipe ends together and check for alignment. If high/low (misalignment) exists, adjust by tightening the high side clamp. When pipe is properly aligned, tighten both clamps simultaneously to ensure against pipe slippage.

f. When checking heater plate surfaces for proper temperature use approved tempilstiks, approved infrared (IR) thermometer, or approved pyrometer on the face of the heater plate. Do not use tempilstiks on the plate area where the pipe will make contact. Clean surface area with a clean cotton cloth or wooden implement if surface area is dirty. (NEVER use metal tools) Do not use any synthetic material, which might melt when placed on the hot heater plate.

NOTE: Heater plate temperature shall be checked prior to each fusion to confirm that the proper temperature is obtained.

(Minimum 400 degrees F – Maximum 450 degrees F)

g. Insert heater in position with the slotted area resting on the flat, machined surface of the machine. Bring the pipe ends against the heater faces using the pipe manufacturer's time, temperature and pressure recommendations for the heating cycle.

h. After the heating cycle is completed, remove pressure on the pipe ends and let them move away from the heater. Remove the heater, being careful not to pull any melted plastic with it and quickly bring the pipe ends together using pipe manufacturer's recommended fusion procedure.

i. When the cooling cycle is completed, unclamp and remove the machine.

j. Visually inspect the joint for uniform, non-porous, well-aligned double bead around its entire circumference. If the joint doesn't meet these requirements, cut it out and restart from Step 2. (Refer to Plexco Heat Fusion Qualification Guide for additional visual acceptance and rejection criteria for PE butt fusions)

3.3 EQUIPMENT CARE AND MAINTENANCE

A. The fusion machines should be cleaned with a dry, clean rag after each use to ensure proper function. Use of a dirty machine can result in contamination of the fusion and can also inhibit smooth movement of the clamp along the guide rods due to soiled lubrication. Clamping and fitting inserts should be cleaned with a wire brush to keep the grooves from accumulating dirt and debris. This will ensure a more stable grip between the clamp and the pipe.

B. Lubrication must be applied to the guide rods whenever the moveable clamp does not slide easily along the rods. Thirty-weight (30w) oil should be applied by removing the side screws on the moveable clamp and inserting oil into the chamber.

C. Check hydraulic oil level, voltage level, and hydraulic pressures on the McElroy No. 28 prior to use.

D. Verify that the guide rods are not misaligned or damaged. This is indicated by smooth, easy movement of the moveable clamp along the rods. Check that the bushings are not worn. If there is any damage or misalignment to the machine, the machine should be repaired.

E. Keep facing tools free of dirt and other debris by wiping with a clean rag. Keep guides on larger facers clean and oiled for smooth, easy movement along the guide rods of the fusion machines.

F. Inspect blades for sharpness. Dull blades will make even, complete facing difficult. If chips, as opposed to long continuous strands, are present during facing, a new facing tool must be used. Blades cannot be resharpened; they must be replaced.

G. If heater plate is not operating within the specified heat range, adjustments may be made by turning the thermostat screw located on the heater plate. **<u>Always</u>** unplug the heater plate before attempting to adjust the thermostat. The heater plate must be checked after adjustment to insure the proper heat range has been attained.

PROCEDURES
ELECTROFUSION

4.0 PURPOSE

This section covers the methods used when joining PE plastic pipe by means of electrofusion.

4.1 GENERAL

The electrofusion method is an acceptable means for joining two dissimilar PE pipes.

4.2 ELECTROFUSION JOINING PROCEDURES

This procedure describes how to join polyethylene 2306/2406 pipe using electrofusion couplings.

A. Equipment Required

1. Approved electrofusion power supply and controls
2. Electrofusion couplings
3. Pipe peeling tool or scraping tool
4. Alignment clamp
5. Clean cotton rag or paper towels
6. Marking pencil
7. Extension Cord - 50 feet long, 12-gauge minimum. (Cords over 100 feet not recommended)

B. Procedure

NOTE: Cleanliness is a must! Coupling should remain in bag until Step 4. Pipe ends shall be kept clean, dry and free from any contaminates.

1. Prepare the pipe ends. The pipe ends shall be clean, undamaged and squarely cut.

2. Using the coupling's centerline as a guide, mark one-half of the coupling length on each pipe end, using a marking pencil.

3. Using an approved pipe peeler, remove the oxidation layer from the surface area of the pipe to be fused, up to the previously made marks. A continuous ribbon should be removed when peeler is used. (Do not peel over the marks.

Chamfer the end of the pipe if the coupling fits tight.)

4. Remove the coupling from the package and slide the coupling fully onto one pipe end. Butt the pipe ends together. The space between the butted ends shall not exceed 1/4". Center the coupling by sliding it back onto the second pipe, making sure it is properly centered and the pipes are butted together.

   CAUTION: To avoid contaminating fusion areas do not touch inside of couplings. If pipe surface becomes contaminated, clean by wiping with a clean paper towel and rubbing alcohol.

5. Secure both ends with the alignment clamp.

6. With the control unit disconnected from 120 VAC power source, connect the fusion leads to the fitting. Be sure connections are clean and tight.

7. Follow instructions on the manufacturer's fusion controls and activate the fusion process.

8. Allow the appropriate cooling time as required by the manufacturer. The fusion leads may be removed during the cooling process. Clamps shall not be removed until the coupling has sufficiently cooled.

9. A visual inspection during and after the fusion process shall be conducted to identify problems such as smoking or melted plastic running out of the coupling. If such problems occur, cut out the coupling and start over.

10. When coupling has cooled per manufacturer's specifications, pressure test or soap test connections as required in Section H-3 of this manual.

PROCEDURES
SADDLE FUSION

5.0 PURPOSE

This Section provides the minimum requirements and information in regard to the procedure for saddle fusion of PE pipe.

5.1 GENERAL

A. Saddle (sidewall) fusion is used to install a branch outlet fitting to the top or side of a main pipe. Tapping tee fittings are usually installed on top of the main, and branch or service saddle fittings on the side of the main. After the joint has cooled, the main pipe wall is pierced (tapped) to enable flow through the branch. "Hot tapping" is saddle fusion to a "live" or pressurized main.

B. Fusion tools and equipment must be correct for the job, and in proper working order

C. Individuals performing polyethylene pipe joining must be qualified in the procedure being utilized or directly observed by an individual that is qualified.

D. Pipe and fitting surfaces must be clean and properly prepared

E. Heating tool surfaces must be clean, undamaged and at the correct surface temperature

F. All connections of dissimilar pipe shall be made with approved mechanical fitting, or electrofusion.

5.2 PE SADDLE FUSION PROCEDURE

A. Before You Start:

1. Inspect pipe and fittings for unacceptable cuts, gouges, deep scratches or other deleterious defects. Damaged products shall not be used (cuts, gouges, or scrapes deeper than 10% of the pipe wall thickness).
2. Be sure all required tools and equipment are on site, in proper working order and fueled up.
3. The pipe and fitting surfaces where tools and equipment are fitted must be clean and dry. Use CLEAN, dry, non-synthetic (cotton) cloths or paper towels to remove dirt, snow, water and other contamination.
4. Shield heated fusion equipment and surfaces from inclement weather and winds. A temporary shelter over equipment and the fusion operation may be required.

NOTE: In some cases, it may be necessary to allow pipe to equalize to the temperature of its surroundings. Allow pulled-in pipes to relax for several hours to recover from tensile stresses.

5. Pipes must be correctly aligned before making connections.
6. All points on both heating tool surfaces where the heating tool surfaces will contact the pipe or fitting ends must be within the prescribed minimum and maximum temperatures and the maximum temperature difference between any two points on the heating tool fusion surfaces must not exceed 20°F (11°C) for equipment for pipe smaller than 18-in. (450 mm) diameter, or 35°F (19°C) for larger equipment. Heating tool surfaces must be clean

WARNING: When Hot Tapping a live gas main, the possibility of gas main blowout increases when internal pressure is higher, when the pipe wall is thinner (higher DR) and when the temperature of the main is elevated.

B. **REQUIRED EQUIPMENT**

1. A saddle fusion machine (application tool/unit) with appropriate clamps for the main pipe and saddle fitting. Use a main bolster or support for 6" IPS (160 mm) and smaller main pipes.
2. **When saddle fusing to a pressurized main, the saddle fusion machine must have a gauge or mechanism that indicates the force applied when the saddle base is pressed against the heating tool or the main.**
3. A heating tool with faces contoured and correctly sized for the main pipe and the fitting base. Both serrated and smooth heater faces will produce quality saddle fusions with the serrated heater faces being preferred.
4. 50-60 grit utility cloth.
5. Timing equipment such as a stopwatch or watch with a sweep second hand when fusing to 2" IPS and smaller mains.

WARNING: Using improper or faulty equipment or failing to follow correct saddle fusion procedure during saddle fusion to a pressurized main can result in death, serious injury or property damage.

NOTE: Saddle fusion machines, tools and equipment from different manufacturers will operate differently. Follow the machine manufacturer's instructions for proper use and operation of the equipment.

C. **SET-UP**

1. Heating tool surface temperature – minimum 490°F (255°C); maximum 510°F (265°C)
2. *Low heating tool temperature can lead to a blowout during saddle fusion to a pressurized main.* Before you begin, all points on both heating tool surfaces must be within the prescribed minimum and maximum temperatures where the heating tool surfaces will contact the main or the fitting. Heating tool surfaces must be clean.

D. **SADDLE FUSION PARAMETERS**

1. Saddle fusion bead-up force, heating force and joining force are printed on the fitting label.
2. ***Bead-Up Force.*** During bead-up, force is applied to form an initial melt pattern on the main and the fitting base. Bead-up ends when melt is visible at the top center of the main on both sides of the heating tool. Bead-up force should not be applied for more than about 1/3 of the total heating time. The bead-up force in pounds is the first number on the fitting label.
3. ***Heating Force.*** The heating force is always zero. During heating, the fitting, heating tool and main are held together, but without applying force. The heating force is the second number on the fitting label.
4. ***Joining Force.*** Joining force is applied to the fitting against the main immediately after the heating tool is removed. Joining force is half the bead-up force. The joining force is the third number on the fitting label. Joining force must be maintained for the duration of the first cooling time period.

   Caution – Never reduce joining force during the first cooling time period. Reducing joining force during the first cooling time period may result in blowout during hot tapping.

   If the saddle fusion machine force gauge reading rises during the minimum cooling time period, allow it to do so. See Table 3 for Minimum Cooling Time.

5. ***Maximum Heating Time.*** Heating time starts when the heating tool is first applied to the main. Heating time ends when the heating tool is removed from in-between the main and the fitting. When hot tapping 2" IPS and smaller mains, a timing device such as a stopwatch or watch with a sweep second hand is necessary for measuring heating time. See Table 3 for Maximum Heating Time.

WARNING – When saddle fusing to a pressurized main, blowout may occur if maximum heating time is exceeded.

6. **Minimum Cooling Time.** Cooling time is two successive cooling time periods. During the first cooling time period, joining force is applied with the saddle fusion equipment.

   WARNING – Never reduce joining force during the first cooling time period, even if joining force increases on its own.

At the end of the first cooling time period, the application tool may be removed. During the second time period, the joint must be allowed to cool undisturbed. After the second cooling time period, the service or branch line may be connected, or pressure leak tests or tapping may be conducted. See Table 3 for Minimum Cooling Time.

Table 3 Maximum Heating Time and Minimum Cooling Time

Main Size Maximum	Heating Time Minimum	Cooling Time
1-1/4" IPS all DR's	Stop heating when about 1/16" bead is visible all around fitting base. ***Do not exceed 15 sec when hot tapping.****	5 min◊ +20 minΔ
2" IPS all DR's	Stop heating when about 1/16" bead is visible all around fitting base. ***Do not exceed 35 sec when hot tapping.****	10min◊+20minΔ
3" IPS and larger	Stop heating when about 1/16" bead is visible all around fitting base.	10min◊+20minΔ
4" IPS and larger	Typically stop heating when 1/8" bead is visible. On large saddle fittings the melt bead may be larger.	10min◊+20minΔ

*** Warning – During saddle fusion to a pressurized main, blowout may occur if maximum heating time is exceeded.**
◊ ***Warning – Never reduce joining pressure during the first cooling time period – Main blowout may occur.***
Δ The service or branch line may be connected, and tapping or pressure tests may be conducted after the second cooling time period. Larger base fittings may require additional cooling time.

E. **PROCEDURE**

1. Preparation
   a) Determine saddle fitting location
      - The area of the main pipe where the saddle fusion machine and the fitting will be located must be clean, dry, and free of deleterious nicks, gouges, or cuts4.
      - The application tool must fit on the main pipe without interference or restriction from components or appurtenances, fusion beads or the like.
      - Remove dirt and foreign materials from the main pipe surface. If below grade, the excavation must be large enough to install and operate the Saddle Fusion Machine.
      - The main pipe must not be curved tighter than 100 pipe diameters bending radius.

      WARNING: Observe all applicable codes, regulations and safety precautions when working in trenches or other excavations and when working with pressurized gas lines.

   b) Install the saddle application tool on the main pipe according to the tool manufacturer's instructions. The saddle application tool should be centered at the location where the fitting will be fused.

   c) Abrade the fusion surface of the fitting base, and the mating fusion surface of the main pipe with 50-60 grit utility cloth. On the main surface, abrade a surface area that is the size of the fitting base plus about 1/2-in (13 mm) per side all around. It is necessary to completely remove a thin layer of material from both surfaces. After abrading, brush the residue away with a clean, dry cloth. **Do not touch abraded and cleaned surfaces with your hands.** Regular replacement of the Utility Cloth is necessary. Worn or dirty utility cloth will not abrade the surface properly. Poor surface preparation can cause poor fusion quality.

   d) Install and lightly clamp the fitting in the saddle application tool. (Tapping tee caps may need tightening.)
      - Move the fitting base against the main pipe, and apply moderate force (around 100 lbs) to seat the fitting against the main pipe and in the application tool. It may be necessary to wiggle the fitting a little to be sure it is completely seated and squarely aligned against the main.
      - While maintaining force, secure the fitting in the saddle application tool. Move the fitting away from the main pipe.

2. Heating
   a) Determine saddle fusion forces from the fitting label.
   b) Verify that the heating tool is maintaining 490-510°F (255-265°C) surface temperature.
   c) Check that heating tool surfaces are clean.
   d) ***In a quick, continuous operation***, center the heating tool beneath the fitting base, place the heating tool on the main, move the fitting against the heating tool, apply the Bead-up Force and begin timing. *This operation should take less than 5 seconds.*
   e) At the first visual indication of main pipe melt at the curved center of the heating tool face on the main (at the crown of the main), reduce Bead-Up Force to Heating Force. Continue timing.

   WARNING: Heating and fusing must be performed accurately and quickly, especially when saddle fusing to a pressurized main pipe. Overheating or excessive time between actions can cause a blowout.

   WARNING: Do not interrupt heating to inspect the melt pattern on the main pipe. When fusing to a pressurized main, this can overheat the main pipe and cause a blowout.

3. Fusion and Cooling
   a) When the heating time ends, ***QUICKLY*** separate the heating tool from the fitting and the main pipe, and remove the heating tool.
      - Saddle fusion machines from different manufacturers may require particular techniques for separating the heating tool from the fitting and the main pipe without disturbing the melt. See the saddle fusion machine manufacturer's instructions.
      - A melt bead of about 1/16" (1.5 mm) or more should be visible around the fitting.
   b) ***QUICKLY*** inspect the melt on the main pipe and the fitting base, and (within 3 seconds) move the fitting against the main pipe, and apply Joining Force. Maintain Joining Force for the first cooling time period.
      - The surfaces of the main and the fitting base should be completely melted.
      - Regardless of the main pipe or fitting melt condition, QUICKLY join the fitting to the pipe, and apply and maintain Fusion Joining Force for the first cooling time period.

WARNING: Blowout – Always join the fitting to a pressurized main pipe after heating. If the fitting is not joined to the main pipe immediately after heating, the pressurized main pipe may rupture

- After Fusion Joining Force has been applied, NEVER reduce Fusion Joining Force until the first cooling time period has ended. Do not reduce the application tool Joining Force setting if the value on the application tool gauge rises.
- The saddle fusion machine may be removed after the first cooling time period has ended.

c) Cool undisturbed for an additional 20 minutes (the second cooling time period). During this time, avoid pressure testing, rough handling, tapping and connecting to the branch outlet. **Do not try to shorten cooling time by applying water, wet cloths or the like.**

4. Inspect

a) If the melt on the main pipe or the fitting base was unacceptable, the saddle fusion should not be placed in service.
To prevent use, the fitting should be cut off near the fitting base. Do not attempt to remove the saddle-fitting base. Leave it in place to reinforce the main pipe. Move to a new location on the main pipe, and install a new saddle fitting. Follow the complete saddle fusion procedure when installing the new saddle fitting in the new location.

b) **Visually Inspect** the fusion bead around the entire fitting base at the main pipe. The fusion bead should be uniformly sized all around the fitting base, and should have a characteristic "three-bead" shape.
- The first bead is the fitting base melt bead.
- The second or outermost bead is produced by the edge of the heating tool face on the main.
- The third or center bead is the main pipe melt bead.
- The first and third beads should be about the same size all around the fitting base.
- The second bead is usually smaller, but should also be uniformly sized around the fitting base.

Table 4 Saddle Fusion Bead Troubleshooting Guide

Observed Condition	Possible Cause
Non-uniform bead size around fitting base	Misalignment; Defective heating tool; Loose or contaminated heating tool saddle faces; Worn equipment; Fitting not secured in application tool; Heating tool faces not within specified temperature
One bead larger than the other	Misalignment; Component slipped in clamp; Worn equipment; Defective heating tool; Loose or contaminated heating tool saddle faces; Heating tool faces not within specified temperature
Beads too small	Insufficient heating; Insufficient joining force
Beads too large	Excessive heating time; excessive force
No second bead (or outermost bead)	Incorrect pipe main heating tool face
Serrated bead appearance	Normal for serrated heating tool faces
Smooth bead appearance	Normal for smooth heating tool faces
Pressurized main pipe blowout (beside base or through fitting center)	Overheating; Incorrect heating tool faces; Heating tool faces not within specified temperature; Taking too much time to start heating (Step 2e), or to remove the heating tool and join the fitting to the main pipe (Step 3b);
Rough, sandpaper-like, bubbly, or Pockmarked melt bead surface	Hydrocarbon contamination
No third (or center) bead	Insufficient joining force

5. Tap fittings in accordance with manufacturer procedure. **(Also see Section M-2 Tapping / Plastic of this manual)**

6. Clean heater faces carefully after each fusion, with a wooden tongue depressor or wooden stick. (DO NOT use metal implements.)

PROCEDURES
SOCKET FUSION

6.0 PURPOSE

This section provides the minimum requirements and information in regard to the procedure for Socket Fusion.

6.1 GENERAL

A. Socket fusion is used to join 4" IPS and smaller tubing and pipe to socket fittings. Socket fittings are available for certain Performance Pipe PE materials.

B. Fusion tools and equipment must be correct for the job, and in proper working order

C. Individuals performing polyethylene pipe joining must be qualified in the procedure being utilized or directly observed by an individual that is qualified.

D. Pipe and fitting surfaces must be clean and properly prepared

E. Heating tool surfaces must be clean, undamaged and at the correct surface temperature

F. All connections to dissimilar materials shall be made with approved mechanical fitting, transition fitting or electrofusion.

6.2 PE SOCKET FUSION PROCEDURE

A. **Before You Start:**

1. Inspect pipe lengths and fittings for unacceptable cuts, gouges, deep scratches or other deleterious defects. Damaged products shall not be used (cuts, gouges, or scrapes deeper than 10% of the pipe wall thickness).
2. Toe-in or necking down is normal at pipe ends, but may need to be removed for socket fusion, or butt fusion to fittings.
3. Remove surface damage at pipe ends that could compromise the joining surfaces or interfere with fusion tools or equipment.
4. Be sure all required tools and equipment are on site, in proper working order and fueled up.
5. The pipe and fitting surfaces where tools and equipment are fitted must be clean and dry. Use CLEAN, dry, non-synthetic (cotton) cloths or paper towels to remove dirt, snow, water and other contamination.

6. Shield heated fusion equipment and surfaces from inclement weather and winds. A temporary shelter over fusion equipment and the fusion operation may be required.
7. Relieve tension in the line before making connections.

When joining coiled pipe, making an s-curve between pipe coils can relieve tension. In some cases, it may be necessary to allow pipe to equalize to the temperature of its surroundings. Allow pulled-in pipes to relax for several hours to recover from tensile stresses.

8. Pipes must be correctly aligned before making connections.
9. Cuts of pipe sizes 2" or smaller may be made using a ratchet single blade style cutter, or a guillotine style cutter. Wheel type tubing or pipe cutters should be used on sizes greater than 2" in diameter.
10. All points on both heating tool surfaces where the heating tool surfaces will contact the pipe or fitting ends must be within the prescribed minimum and maximum temperatures and the maximum temperature difference between any two points on the heating tool fusion surfaces must not exceed 20°F (11°C) for equipment for pipe smaller than 18-in. (450 mm) diameter, or 35°F (19°C) for larger equipment. Heating tool surfaces must be clean

B. **Required Equipment**

1. Chamfering Tool
2. Depth Gauge (some manufacturers combine Chamfering Tool and Depth Gauge)
3. Cold Ring Clamp
4. Heating Tool with male and female socket faces (should meet ASTM F 1056 *Socket Fusion Tools for Use in Socket Fusion Joining Polyethylene Pipe or Tubing and Fittings*)
5. Timing equipment (such as a watch with a second hand).
6. Holding tools are desirable for 2" IPS (90 mm OD) and larger pipe and fittings.
7. Clean work gloves are suggested.

C. **Set-up Parameters**

1. **Heating tool surface temperature – Minimum 490°F – Maximum 510°F**
2. Where heating tool surfaces will contact the main or the fitting, all points on both heating tool surfaces must be within the prescribed minimum and

maximum temperatures before you begin.

3. Molten PE material may be cleaned from heating tool faces with a wooden implement such as a tongue depressor.
4. To remove burned or charred material from socket faces, heat the faces, insert a short length of pipe or tubing into the female face, and a socket fitting onto the male face, then unplug the heating iron and let it cool completely. When the pipe or tubing and the fitting are removed from the cold heating tool, the burned or charred material will come off with them.

D. **Procedure**

1. Preparation
   - Heating Tool Socket Faces at specified temperature **490 - 510°F (255 - 265°C).** The male and female socket faces on the heating tool must be clean.
   - Square end cut - The pipe or tubing end must be squarely cut. If the end is not squarely cut, use a plastic pipe cutter or hand saw and cut the pipe or tubing end squarely.
     - o When using a wheel-type pipe cutter, be sure the cutter wheel does not thread down the pipe – cut off all partial cuts before fusion.
     - o On larger pipes, toe-in may need to be removed before fusion.

   a) Chamfer OD - For all pipe and tubing sizes, chamfer the end to remove the sharp outer edge on the OD. Remove all burrs from inside of pipe ends. Make sure the pipe or tubing end is clean, dry, and free of foreign substances. Wipe with a clean, dry, lint-free cloth or paper towel. **Do not touch** cleaned surfaces with your hands.

   b) Install Depth Gauge & Cold Ring Clamp - Place the Depth Gauge snugly over the chamfered end of the pipe, and clamp the Cold Ring Clamp on the pipe or tubing OD immediately behind the Depth Gauge. Remove the Depth Gauge.

   c) Clean fitting socket - Wipe the fitting socket with a clean, dry, lint-free cloth or paper towel. **Do not touch** cleaned surfaces with your hands.

   d) Review **Table 6** for recommended heating and cooling times.
      - In socket fusion, there is an interference fit between the pipe or tubing and the socket, that is, the socket is slightly smaller than the pipe. They won't fit together cold.
      - Heating tool faces are tapered which produces a tapered melt. Therefore, the pipe or tubing and the fitting will tend to push away from the heating tool during heating, and will tend to push

apart when first joined together. It is necessary to hold the pipe and fitting against the heater faces during heating, and to hold them together when fusing.

- When using a socket coupling to join coiled pipe, if possible "S" the pipes on either side of the coupling to compensate for coil curvature and make it easier to join the second pipe to the coupling.

2. Heating
   a) Verify that the heating tool is maintaining the correct temperature.
   b) First firmly seat the socket fitting onto the male socket face. The socket fitting must bottom out completely and be held against the back surface of the male heater face.
   c) Then push the pipe or tubing end into the female socket face. The Cold Ring Clamp must be completely against the female socket face, and held in place.
   d) Heating time starts when the cold ring is against the female heater face.
   e) Hold the fitting and the pipe or tubing in place against the heater faces for the Table 6 heating time.

DO NOT TWIST PIPE, FITTING, OR HEATING TOOL.

3. Fusing
   a) At the end of the heating time, **Quickly** remove the pipe from the Heating Tool, then the fitting from the Heating Tool. **Snap them straight off** with a sharp rap on the Heating Tool handle.
      - o Important: Remove the pipe and the fitting straight out from the Heating Tool faces. Do not displace the melt. If the pipe or fitting are removed at an angle or twisted, melt can be displaced, and the joint may leak or fail. Grasp the pipe behind the cold ring clamp. Pulling on the cold ring clamp handle can cause slippage or displace the melt.
   b) **QUICKLY** check the melt pattern on pipe end and the fitting socket. The surfaces should be 100% melted with no cold spots.
      - o If the melt is not complete, do not continue with the joint. Cut off the melted pipe end, use a new fitting and start over from Step 1. *Do not re-use a melted fitting.* If the melt is correct, continue the joining procedure.
   c) Within 3 seconds after removing from the Heating Tool, firmly push the pipe end and the fitting socket straight together until the Cold Ring Clamp makes firm contact with the end of the fitting socket.

- Grasp the pipe behind the cold ring clamp. Pushing on the cold ring clamp handle can cause slippage or a crooked joint.

e) Hold the pipe and fitting firmly together for the Table 6 cooling time. **DO NOT TWIST PIPE OR FITTING.**
- Important: Push the pipe and fitting straight together. If joined at an angle or misaligned, the joint may leak or fail.

4. Cool

a) Holding force may be relaxed when Table 6 cooling time ends. After an additional 3 minutes undisturbed cooling time, the Cold Ring Clamp may be removed. Allow an additional 10 minutes undisturbed cooling time before testing, backfilling, or stressing the joint.
- Total cooling time is the Table 6 cooling time (joint held together firmly), plus 13 minutes.

b) A good joint will have a uniform melt ring that is flat against the socket and perpendicular to the pipe. There should be no gaps or voids between the fitting and the pipe.

c) Clean heater faces carefully after each fusion with a wooden implement such as a tongue depressor to remove any molten PE from the male and female socket faces.

Table 6 Socket Fusion Heating & Cooling Times

Pipe Size	PE 2406		PE 3408	
	Heating Time, seconds	Cooling Time, seconds	Heating Time, seconds	Cooling Time, seconds
1/2" CTS	6 – 7	20	6 – 10	30
3/4" CTS	6 – 7	20	6 – 10	30
1" CTS	9 – 10	20	9 – 16	30
1-1/4" CTS	10 – 12	20	10 – 16	30
1/2" IPS	6 – 7	20	6 – 10	30
3/4" IPS	8 – 10	20	8 – 14	30
1" IPS	10 – 12	30	15 – 17	40
1-1/4" IPS	12 – 14	30	18 – 21	40
1-1/2" IPS	14 – 17	30	20 – 23	40
2" IPS	16 – 19	30	24 – 28	40
3" IPS	20 – 24	40	28 – 32	50
4" IPS	24 – 29	40	32 – 37	50

5. Inspect
   a) Visually Inspect the end of the socket fitting at the pipe. There should be a clear impression of the Cold Ring Clamp into the melt ring at the end of the fitting, with no visible gaps or voids around the pipe at the socket melt ring.

b) The pipe and fitting should be aligned straight with each other.

Table 7 Socket Fusion Troubleshooting Guide

Observed Condition	Possible Cause
No cold-ring impression in socket fitting melt used, or set at incorrect bead	Depth gauge not used; Cold ring not depth;
Gaps or voids around pipe at socket fitting edge	Pipe or fitting not removed straight from heater face (twisting or removing from heater face at an angle); Pipe or fitting not inserted straight into each other when fusing; Joining together at an angle; Twisting while joining pipe and fitting together; Cold ring not used or set too deep
(When viewed from inside, or when qualifying or tubing end	Incorrect heating sequence – always push the pipe or tubing into the heater **after** the fitting has been pushed on the heater (inserting the tubing first heats the tubing too long); Cold ring set too deep; Cold ring not used lengthwise cut joint) Wrinkled or collapsed pipe
(When qualifying lengthwise cut joint) voids in fusion bond area	Pipe or fitting not removed straight from heater face (twisting or removing from heater face at an angle); Pipe or fitting not inserted straight into each other when fusing; Joining together at an angle; Twisting while joining pipe and fitting together; Cold ring not used or set too deep

PROCEDURES
SOCKET FUSION

Observed Condition	Possible Cause
(When qualifying lengthwise cut joint) Unbonded area on pipe or tubing at end of pipe or tubing	Cold ring not used or set too deep
(When qualifying lengthwise cut joint) Socket melt extends past end of pipe or tubing	Cold ring set too shallow
Rough, sandpaper-like, bubbly, or pockmarked melt bead surface	Hydrocarbon contamination

PROCEDURES
PLASTIC PIPE RISERS

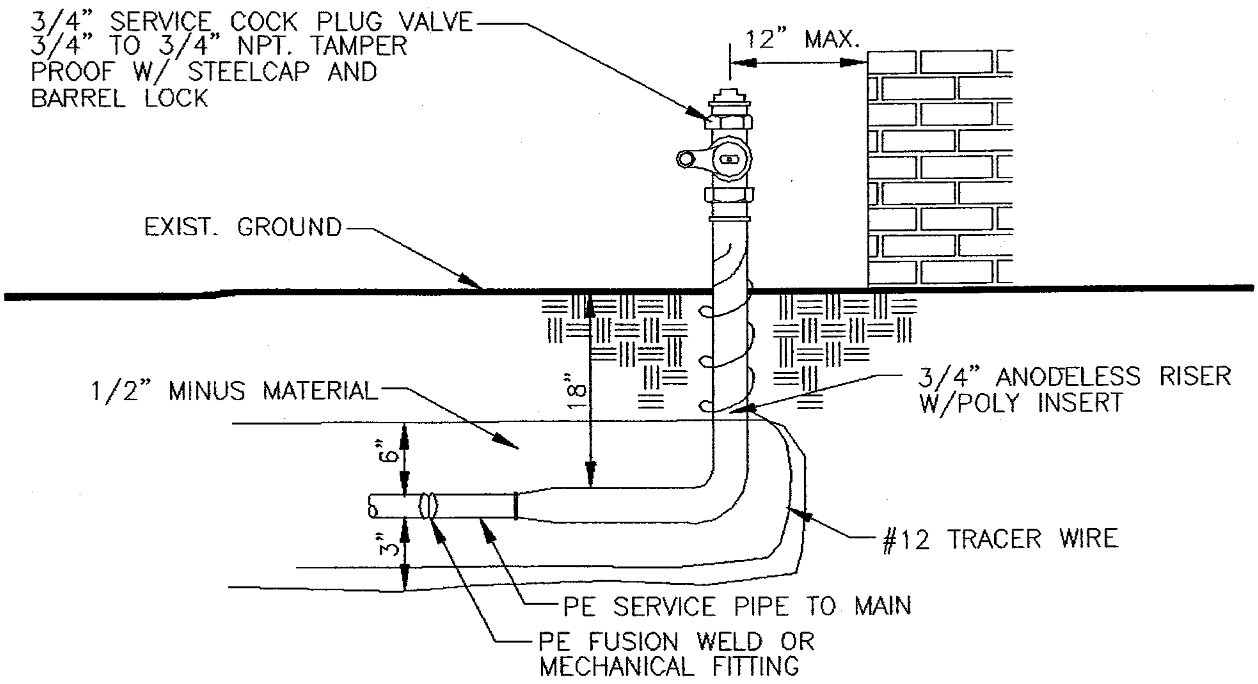
7.0 PURPOSE

This section identifies the acceptable risers for use in the operators system and the acceptable installation procedures.

7.1 GENERAL

A. Anodeless risers are preferred and should be used wherever practical.
B. Prefabricated steel risers may be used only when absolutely necessary.
C. Risers should be installed 8" to 12" from the building or structure to which they serve.

SERVICE RISER



NOTE:
ALL RISERS MUST BE PLUGGED
& THE STOP COCKS OFF.

PROCEDURES
PLASTIC PIPE RISERS

7.1 INSTALLATION OF ANODELESS RISER

The anodeless riser connects polyethylene (PE) service piping to a meter set assembly (MSA) and does not require cathodic protection.

A. The installation of the riser with respect to finished grade should be made by locating the red stripe on the manufacturer's label at finished grade.

B. The locator wire shall not be electrically connected to the riser.

C. Locator wire should be installed with each service riser, terminating between the top of sleeving, if required, and below the stopcock. Wrap several times around the riser for easy access.

D. If a bypass is needed on a ground-level riser, a threaded tee may be installed above the stopcock to facilitate the bypass.

E. Anodeless risers shall not be altered.

F. Anodeless risers shall not be subjected to welding, brazing, cad welding, or any source of extreme heat.

F. Sleeves, when required, are to be installed so that the top of the sleeve is approximately 6 inches below bottom of stopcock.

7.2 PREFABRICATED RISERS

A. Prefabricated risers shall be bent to 90 degrees without causing a wrinkle in the bend. Miter welds are not allowed.

B. Prefabricated risers shall have an approved factory coating or the riser shall be field wrapped.

C. Care shall be taken to protect the factory coating from damage.

D. Prefabricated risers installations shall include cathodic protection by placement of an approved anode or connection to the impressed current system.

PROCEDURES
PLASTIC PIPE RISERS

E. Connection of the riser to the plastic service shall be by means of a transition fitting or an approved mechanical fitting.

PROCEDURES
CONTROLLING GAS FLOW / PLASTIC PIPE

8.0 PURPOSE

This section identifies the safe procedures implemented within the Operator's system for controlling the flow of gas.

8.1 GENERAL

The primary method to control the flow of gas through polyethylene pipe and tubing is by squeezing utilizing the approved squeeze tool.
Refer to Section B-6 Static Electricity

8.2 METHODS FOR CONTROLLING GAS FLOW THROUGH PE PIPE

A. Squeezing
The proper size tool shall be selected for the particular pipe size to be squeezed.

NOTE: During squeezing operations, the squeezing tool shall be grounded. Use jumper cable or locator wire attaching the ground rod to the squeezing tool.

1. Select the proper squeeze tool with the retractable lower jaw in the correct position for the particular pipe or tubing size to be squeezed (ASTM F 1563)
2. Tool shall be visually centered on the pipe
3. Tool shall have a mechanical stop
4. Hydraulic tools should have relief control stop
5. Properly ground the tool before proceeding
6 Place the squeeze tool over the particular pipe or tubing where the squeeze is to be made, centering the pipe or tubing in the squeeze tool.
7. Tighten the squeeze tool slowly, creating a cold flow condition, until shutoff of the gas flow is achieved.
   a. Above 32^0 F: **maximum 1 minute per inch of pipe diameter**
   b. Below 32^0 F: **maximum 2 minutes per inch of pipe diameter**
8. For large diameter pipe, 3" and above, pause for 1 minute when squeeze is half way (1/2) and again when three quarters (3/4) complete do then same when releasing the squeeze
9. The reestablishment of gas service is accomplished by releasing the squeeze tool slowly (**Same maximum rates as above**).
10. **PE pipe shall not be squeezed more than one time in the same area.**

Leave a minimum of one pipe diameter between squeeze points

11. Mark the squeeze area by wrapping a piece of electrical tape around the circumference of the pipe to identify the previous squeeze if uncovered again in the future.
12. Soap test the squeeze are to ensure no damage resulting in leakage occurred during the squeeze procedure. (Pinhole leaks may appear)
13. If the pipe is damaged or leakage is present, replace the affected section of pipe
14. If under emergency conditions a squeezer not approved for the specific application is used, **squeeze shall be cut out and pipe replaced after the emergency is concluded**

NOTE: When complete with the squeeze, the squeeze tool may be rotated 90^0 and used to reshape the pipe. Caution, do not re-flatten the pipe.

NOTE: If 100% shut-off is not achieved, it may be necessary to install a second squeeze tool at a safe location away from the first squeeze

B. <u>PE Valves</u>

Valves are designed to be used to control gas flow. Prior to operating any valve:

1. Check system maps and records to ensure what will result due to the valve operation
2. Obtain management approval
3. Determine proper operating procedure for valve

Note: Section G (Valves), Section Q (Emergency Response Plan), and Isolation Plan contain the appropriate information.

C. <u>PVC Pipe</u>

1. PVC and other plastic pipes may include the installation and/or use of pressure control fittings
2. Caution shall be exercised when squeezing PVC plastic pipe to avoid further cracking of the pipe.
   i. PE squeeze tools may be used if specific PVC tool is unavailable
   ii. In cold weather conditions, wrap cotton rags soaked in hot water around the PVC pipe for a period of 5 minutes or more. This may soften the PVC

enough to avoid cracking when squeezed

8.3 GAS BYPASS

A. Prior to shutting down mains or services, verify if bypass is needed.
   1. Refer to system maps and records
   2. Verify pressure by use of gauges

B. When bypass is required, it may be necessary to contact the Engineering Department to determine size and number of bypasses needed.
   1. Two bypassing methods are approved for use:
      a. Tap Tees
      b. Service riser to service riser.
   2. Gauges shall be placed on either side of the bypass area
   3. Monitor pressure before and after isolation of the area
   4. When removing bypass from mains or services, the tubing or pipe shall be cut and capped at the tee as close as practical, but a minimum of 1 Ft form the tee.

8.4 SAFETY

A. Every effort shall be exercised to prevent entering area of blowing gas.

B. The preferred method to control escaping gas is to drop back a safe distance to control gas flow either by squeezing, use of valves or control fittings.

C. Should the situation require entering an area of escaping gas, the appropriate fire protection steps shall be implemented.
Refer to Section B-2, Personal Safety

PROCEDURES
PLASTIC PIPE REPAIRS

9.0 PURPOSE (192.311)

This section covers the safe procedures in making permanent repairs to plastic pipe.

9.1 GENERAL

A. The only approved method to permanently repair damaged polyethylene pipe is to replace the damaged section of pipe between squeeze points. **Do not attempt permanent repair to damaged plastic pipe smaller than 4 inches in diameter..**

B Approved repair clamps may be utilized for emergency temporary repair of plastic pipe. **(Not to exceed 48 hours)**

C. The use of an Electrofusion repair patch is approved for 4 inch and larger diameter PE pipe when replacement is impractical.

9.2 PLASTIC PIPE REPAIRS

A. To facilitate the repair, use pre-tested pipe and the appropriate fusion procedure. Follow the applicable, appropriate joining procedure for replacement as established for plastic pipe installation.

B. Always soap test tie-in points

C. In the case of a service line repair, test service repair up to and including the riser

D. Purge at the riser

E. Always mark and soap test squeeze points

PROCEDURES
PLASTIC PIPE MECHANICAL FITTINGS

10.0 PURPOSE

This section identifies the mechanical fittings approved for use in the Operator's gas system.

10.1 GENERAL

A. Only approved mechanical fittings may be installed in PE gas systems.

B. The use of lubricants with mechanical fittings is not permitted.

10.2 CONTINENTAL TAP TEE (PE) PIPE APPLICATION

A. Approved tools
- 7/16 in. wrench
- Marking pen
- 1/8-in tapping tool
- Clean cotton cloth or paper towel

B. Joining procedure (tee to main)
- Clean main with clean cloth or towel.
- Inspect pipe for defects.
- Inspect tapping tee and components for defects.
- Make sure that O-rings are clean and properly positioned.
- Mount tapping tee on main and insert bolts.
- Bring top and bottom of tapping tee together evenly by cross tightening the bolts.
- Ensure that tee is secured firmly to the main.

C. Join fitting outlet connection
- Clean the pipe end with a clean cotton cloth or paper towel. The pipe end should be undamaged and squarely cut.
- Inspect the pipe to ensure there are no cuts or gouges located in the sealing area of the pipe.
- Remove the components from the plastic bag and examine for defects. Make sure the o-rings are clean and positioned properly.
- Mark the stab length on the pipe as shown in the following table:

STAB DEPTH	
Pipe Size (Inches)	Stab Length (Inches)
½ CTS	2
¾	2-3/8
1 CTS	2-3/8

- Loosen the compression nut until the seal ring is no longer compressed, then insert the pipe until it bottoms out in the outlet.
- Tighten the compression nut until it shoulders against the outlet. Do not over tighten. The line marked for stab length should be no more than 3/8 - in. from the face of the compression nut.

D. Tapping the tee
- Pre-mark the tapping tool or measure the tapping distance before starting the tap.
- Insert the proper tool into the proper tapper.
- Tap the main by turning the tapper in a clockwise direction.
- The tap is complete when the top of the tapper is below the top of the tee tower
- After the main has been tapped, bring the tapper up until it is flush with the top of the tee tower.
- Thread completion cap onto the tapping tee until it is hand tight. Do not use wrench.
- Do not use soap on the O-ring.

10.3 CONTINENTAL HVTT (PE) PIPE APPLICATION

A. Approved tools
- ½-in wrench
- Marking pen
- Continental tapping tool
- 24-in pipe wrench
- Clean cotton cloth or paper towel

B. Joining procedure
- Clean main with clean cloth or towel.
- Inspect pipe for defects.

- Inspect tapping tee and components for defects.
- Make sure that O-rings are clean and properly positioned.
- Mount tapping tee on main and insert bolts.
- Tighten center bolts first, using care to pull the top and bottom together evenly by alternating front to back.
- Tighten remaining bolts evenly by cross tightening the bolts until the flanges of the saddle come together.
- Make sure that the tee is secured firmly to the main.

10. 4 PERMASERT (PE) PIPE APPLICATION

A. Approved tools

- Marking pen
- Tape Measure
- Chamfer tool
- Clean cotton cloth or paper towel
- Plastic tubing cutter

B. Joining procedure

- Cut off the tubing so that the end is square.
- Wipe the tubing with a dry, clean cotton cloth or paper towel.
- Inspect the tubing for surface defects

NOTE: If excessive scratches or gouges are visible, cut off the defective area and repeat the above steps

- Using the chamfer tool, chamfer the end of the tube
- Using the marking pen, mark the tube at the stab depth from the chamfered end by measuring the distance from the moisture seal to the end of the coupling body.
- Insert the tubing straight into the coupling until it bottoms.
- Measure the distance of the reference mark from the body of the coupling. The mark must be within 1/8 inch of the moisture seal.
- Pressure test the finished joint in accordance with PM H-3 Pressure testing. The reference mark can move outward up to an additional 3/8" during pressure testing.

10.5 LYCOFIT (PE) PIPE APPLICATION

A. Approved Tools
- Ratchet
- Ratchet cutter
- Vise grip tool / LycoRing (disposable plastic grip ring)
- Marking pen
- Lyall tool
- Clean cotton cloth or paper towel

B. Joining Procedure
- Clean pipe ends with clean cloth or towel. Pipe ends should be undamaged and square cut.
- Inspect pipe for any imperfections within the sealing area. Cut out any imperfections.
- Remove and inspect fitting components for defects.
- Slide completion sleeve onto pipe
- Clamp pipe jaw vise grip onto pipe with a length of pipe extending behind the pipe jaw that is equal in length to the coupling spigot.
- If using the LycoRing, slide it, small diameter first onto the PE pipe and position it approximately ½ inch further than the length of the fitting spigot.
- Slide the completion sleeve over the LycoRing and against the tab so that the LycoRing grabs the PE pipe.
- Insert the line-up nose of the spigot into the pipe. Position the pipe and the spigot in the tool location plates.
  - o The spigot portion of the fitting should be placed in the fixed jaw of the tool. (This part of the tool has the jaw attached to the handle not the traveler or rack portion.) The pipe and sleeve will then be pulled onto the spigot by the traveler/rack portion of the assembly tool.
  - o When using a reducer fitting, the smaller side of the fitting should be assembled first. The spigot is placed in the fixed jaw of the tool during assembly of both sides.
- Operate the ratchet until the pipe completely covers the last spigot barb.
- Remove the pipe jaw vise grip tool from the pipe, or remove the LycoRing by pulling on its tab. Position the pipe, completion sleeve and spigot in the tool

locating plates. Continue operating the ratchet until the completion sleeve meets the coupling flange.

10.6 METFIT MECHANICAL FITTINGS

A. Use only METFIT approved crimp tool

B. Preparation

1. Cut ends of pipe/tubing square, use approved cutters not a hacksaw
2. Remove burs from pipe/tubing
3. Mark the insertion depth on the pipe with and approved marking pen (1 1/8")
4. Slide compression ring over pipe (Flanged end toward fitting)
5. Push pipe into the fitting until end butts against shoulder inside the fitting
6. The insertion depth mark should line up with the fitting (if not try again but do not proceed if unable to line up properly)
7. Fitting is now ready to be crimped

C. Crimping Procedure

1. Open the jaws of the appropriate crimp tool
2. Stationary jaw is placed at back of fitting shoulder
3. Movable jaw is placed at back of compression ring
4. Close the jaw until the compression ring is pulled past the locking rib
5. Open jaw and remove tool

D. Inspect and Complete

1. Visually inspect to ensure crimp ring is fully in place past the locking rib all around the circumference of the fitting
2. If not, rotate the fitting or the tool 90^0 and repeat the crimping procedure
3. When visual inspection and completion verified follow the same procedure for the other side of the fitting

E. When fitting is complete no time is required before installing and backfilling

PROCEDURES
PVC PLASTIC PIPE SOLVENT CEMENT JOINING

10.0 PURPOSE

This section identifies the approved method for solvent cement joining of PVC pipe.

10.1 GENERAL

1. This procedure applies to $^{3}/_{8}$ in IPS through 2 in IPS pipe and fittings.

10.2 APPROVED TOOLS

- Tubing cutter or hacksaw with fine tooth blade
- De-burring tool / file
- 2711 solvent cement
- C-65 cleaner
- 120 grit emery cloth
- Clean cotton cloth or paper towel
- Measuring tape
- Permanent marker
- Timepiece / watch

10.3 JOINING PROCEDURE

1. Clean the pipe ends with a clean cotton cloth or paper towel. The pipe ends should be undamaged and squarely cut

2. De-burr the inside and outside of the pipe ends

3. Sand the outside of the pipe end(s) and the inside of the coupling or fittings

4. Test fit all the joints. If the fit is loose, poor or defective, replace the fitting or pipe section

5. Measure the stab depth of the fitting socket. Mark the distance measured on the pipe. To ensure the pipe is bottomed out in the fitting, measure an additional inch back from the stab depth mark and apply a reference mark to the pipe

6. Apply C-65 cleaner to the fitting socket, keep the surface and applicator wet and in motion for 5 to 15 seconds. Apply a second application of cleaner if necessary

7. Apply C-65 cleaner to the pipe, equal to the depth of the socket, in the same manner as Step 6

8. Apply C-65 cleaner to the fitting socket, in the same manner as Step 6

9. Immediately, while the cleaned surface is still wet, apply a full, even layer of 2711 solvent cement to the pipe, equal to the depth of the socket

10. Apply a full, even layer of 2711 solvent cement to the fitting socket

11. Apply a full, even layer of 2711 solvent cement to the pipe, equal to the depth of the socket

12. Assemble the pipe and fitting without delay while the cement is still wet. Use sufficient force to ensure the pipe bottoms out in the fitting socket. If possible, twist the pipe or fitting $^1/_8$ to ¼ turn as you insert

13. Remove any excess cement immediately with a clean cotton cloth or paper towel while holding the joint together for a minimum of 30 seconds to ensure the pipe or fitting does not pull apart

14. Check the stab depth mark to ensure the fitting has bottomed out. Re-mark the stab depth mark if necessary to ensure the pipe or fitting does not pull out of the connection

15. Allow the solvent cement joints a minimum ten minutes to cure before pressure testing or being placed into operation. Avoid placing the joint in a stressed condition.

PROCEDURES
STEEL PIPE GENERAL

1.0 PURPOSE

It is the purpose of this section to provide the minimum requirements and information on equipment, materials, and methods utilized in the fabrication of steel pipe and related fittings.

1.1 SCOPE

This section covers the following:

A. Handling and Care of Steel Pipe

B. Welding

C. Controlling Gas Flow

D. Repair

E. Threaded and Flanged Joints

F. Above ground installation

1.2 GENERAL

Steel pipe is utilized primarily for systems exceeding a 60 psig MAOP.

A. Newly installed and replacement steel pipe shall be factory wrapped or field wrapped in accordance with the procedures in this manual. **Refer to Section L-6, Wrapping**

B. The enclosed specific welding procedures have been qualified for steel distribution piping by Sunrise Engineering, Inc.

1.3 OBOVEGROUND INSTALLATIONS

A. May require the installation of either vertical or horizontal dog leg(s) to accommodate expansion and contraction

B. Pipe shall be appropriately supported to avoid undue stress on pipe and fittings

PROCEDURES
STEEL PIPE GENERAL

C. Plastic pipe may only be used for temporary aboveground installations not to exceed 2 years time

PROCEDURES
STEEL PIPE HANDLING AND CARE

2.0 PURPOSE

All steel pipe shall be handled in such a safe way as to protect the pipe and pipe coating from unnecessary damage.

2.1 SCOPE

A. Pipe Handling
B. Care of pipe and coating
C. Inspection

2.2 HAULING PIPE

A. When hauling pipe on a truck or trailer, the pipe shall be securely fastened to the vehicle so as not to allow the pipe to move when the vehicle is starting, turning, or braking.

B. Pipe shall be padded or on skids, and strapped as not to damage the pipe.

2.3 UNLOADING PIPE

A. Steel pipe greater than 2" in size shall be unloaded by the use of mechanical lifting device. The pipe shall not be turned loose to roll down the skids.

B. Signals used during the process of unloading shall be given by only one person in order to avoid confusion.

C Pipe retaining stakes shall remain in place on the truck or trailer body until the bottom layer of pipe is to be unloaded.

2.4 LIFTING

A. Extreme caution shall be exercised when pipe is lifted. Be sure there is a clearance between the pipe and any other object to prevent injury.

B. When lifting, take a firm grip, secure good footing, place feet a comfortable distance apart, bend knees, keep back straight, and lift with leg muscles.

C. Do not twist or rotate the spine to set a load down or pick the load up. If the load is to be carried, keep the spine straight and move the feet.

D. Get help when needed. Use cranes or hoists to lift heavy loads.

E. Use gloves or other hand protection as required when handling materials.

F. Never carry a load in such a way that it obstructs the vision.

G. Use nylon straps or slings when unloading.

2.5 PIPE STORAGE

A. Care shall be taken in the storage of coated pipe.

1. Storage of coated pipe shall not be in areas where gravel, rocks or pavement could damage or penetrate the coating.

2. Storage shall be on wooden strips not less than 4" wide for 2" pipe and not less than 6" wide for 4" and larger pipe.

3. Storage on roadsides, right-of-ways, or projects shall be on padding to prevent damage to the coating.

4. Yard storage shall be done in a way to protect the pipe coating from undue exposure to ultraviolet rays

B. The material delivery truck shall follow the precautions listed above for storage. In addition, the following special procedures must be followed:

1. The coated pipe will be laid on wooden strips to eliminate damage to the coating by residue of gravel and cold patch on the bed of the truck.

2. Sufficient bedding shall be placed on top of the pipe to prevent damage to the pipe coating when the load is tied down.

C. The following equipment shall be used for loading and unloading coated pipe:

PROCEDURES
STEEL PIPE HANDLING AND CARE

1. A 4" or wider rope or belt sling.

2. A "fitted" pipe clamp.

3. A spreader which grips each end of the pipe with aluminum inserts.

4. At no time shall a chain sling or steel wire rope be used to lift or move coated pipe.

2.6 PIPE STRINGING

Coated pipe which is stockpiled or strung along trench side shall be supported on wooden blocks to hold the pipe off the ground.

Bare or coated pipe shall not be rolled from stringing trucks or handled in any manner which would distort the round form of the ends or scratch, scar or dent the pipe.

Pipe stringing shall be done in such a manner as not to cause a hazard to, or be subjected to possible damage by traffic.

No private drives shall remain blocked overnight, and inform customers of limited access.

2.7 PIPE BENDING

Horizontal and vertical bends may be accomplished by one of three methods:

1. Welded steel elbows
2. Mechanical bending
3. Sagging
4. Miter joints shall not be used unless approved by the engineer.

Refer to Section E-9

2.8 INSPECTION

All pipe will be visually inspected during unloading for damage to the pipe or coating. Any damage to the pipe structure that would be detrimental to the integrity of the facility will be removed or repaired.

PROCEDURES
STEEL PIPE WELDING - GENERAL

3.0 PURPOSE (192.245)

It is the purpose of this section to provide the procedures and requirements that must be used when safely performing welding. **Weld procedures shall conform to API 1104**

There are a number of inherent hazards in the use of welding and cutting apparatus. It is, therefore, necessary that proper safety and operating procedures be understood prior to the use of such apparatus. Read the following thoroughly and carefully before attempting to operate welding and cutting apparatus. A thorough understanding of the proper safety and operating procedures should always be practiced.

3.1 SCOPE

A. Welding Safety
B. Equipment Care
C. Work Area
D. Fire Protection
E. Requirements
F. Segments

3.2 GENERAL SAFETY

The following precautions shall be taken prior to and during welding operations:

A. Welders will be responsible during welding operations to ensure all Operator safety regulations and equipment are at the job site and used by other workmen.

B. Appropriate safety equipment must be worn by welders and anyone working near them. Caution must be exercised to protect the public from eye injuries at all times.

C. No welding shall be performed on a main or service while under pressure test.

D. Crew leaders shall assure themselves that no gas or gas-air mixture is present in the excavation before the welder begins work by using a CGI in confined areas. Flashing and sounding the bell hole with an acetylene torch is acceptable.

NOTE: The flashing and sounding procedure for a bell hole will be performed as follows:

1. Light torch with a neutral flame and then pass the torch around the entire excavation.

2. Turn torch off and turn on acetylene gas only. Pass torch around entire excavation. If torch does not light, it is safe to enter the excavation.

E. When welding or cutting work is conducted in areas involving buildings and combustibles, special precautions must be taken to prevent possible fire from sparks.

F. No welding on a given line shall be done within 12" of a transition fitting unless specifically authorized by a field supervisor. Plastic pipe shall be protected from welding sparks or open flame with wet rags.

G. No welding on a given line shall be done within 12" or 1 pipe diameter, whichever distance is greater, of a line stopper fitting.

3.3 EQUIPMENT CARE AND SAFETY

A. Qualifications for Using Welding Equipment

Welders may use any welding equipment for which they have been properly trained and qualified. Welder helpers shall be under the direction and supervision of the welder.

B. Care of Equipment

Oil or grease of any kind shall never be used on any regulator, torch, hose, tank or other equipment used in acetylene welding. Extreme care shall be used to prevent any kind of oil or grease from accidentally contacting acetylene welding equipment.

C. Storing and Using Acetylene Tanks

Acetylene tanks shall be used and stored in an upright position. This is to prevent the liquid (acetone) from flowing from the tank.

D. Hauling Oxygen and Acetylene Tanks

Oxygen and acetylene tanks shall be handled with care. When being moved, except in carts and racks, gauges must be removed and the valve caps screwed on tight.

E. Opening Acetylene Tanks

Acetylene tank valves shall not be opened more than one turn.

3.4 WORK AREA

A. The work area must have a fireproof floor of concrete, or dirt.

B. Heat-resistant shields or other approved material should be used to protect nearby walls or unprotected flooring from sparks and hot metal.

C. Adequate ventilation is required to prevent the concentration of oxygen and toxic fumes. It is important to remember that oxygen itself will not burn, but the presence of pure oxygen will serve to accelerate combustion and cause materials to burn with great intensity. **OIL AND GREASE IN THE PRESENCE OF OXYGEN CAN IGNITE AND BURN VIOLENTLY.**

D. Steel benches or tables to be used during oxy-fuel processes must have fireproof tops.

E. Oxygen and fuel gas cylinders should be chained or otherwise secured to wall, bench, post, cylinder cart, etc., to protect them from falling and to hold them in an upright position.

F. When welding or cutting on equipment, the fuel tank shall be protected.

NOTE: **Before welding on equipment, refer to manufacturer's manual for any welding restrictions. Welding on equipment shall be performed by qualified welder utilizing the proper welding rod for that application.**

G. Welding and cutting shall not be done within 3' of oxygen or acetylene tanks or around any combustible material such as grass, lumber, poles, or other material that might catch fire.

3.5 FIRE PROTECTION

A. Fire protection should be practiced whenever oxy-fuel operations are in process. A few simple precautions can prevent most fires and minimize damage in the event a fire does occur. The following rules and safety procedures should always be practiced.

1. Never use oil or grease on or around any oxy-fuel apparatus. Even a trace of oil or grease can ignite and burn violently in the presence of oxygen.
2. Keep flames and sparks away from cylinders and hoses.
3. Flying sparks can travel as much as 35', so move combustibles a safe distance away from areas when oxy-fuel operations are to be performed.
4. Use approved heat-resistant shields to protect nearby walls, floors and ceilings.

B. The operator should protect himself from sparks, flying slag, electric arc, or flame brilliance at all times. Select welding lens with correct tempered shade for particular welding process to protect eyes from injury and to provide good visibility of the work.

Protective gloves, sleeves, aprons, and shoes should be worn to protect skin and clothing from sparks and slag. **KEEP ALL CLOTHING AND PROTECTIVE APPAREL ABSOLUTELY FREE OF OIL OR GREASE.**

C. When working in holes, manholes or vaults, welders shall be assisted by a helper. If they are not needed in the bell hole or the ditch, they shall remain on top of the excavation to attend the welder and watch for fire, cave-in, etc.

D. When performing a Fire Control Tie-in the following shall be followed:

1. Have at least two 20-pound dry chemical fire extinguisher at the job during the entire operation.
2. Before starting welding or cutting operations, flash bell hole before entering.
3. During fire control tie-in operation allow only the minimum number of personnel in bell hole.
4. Personnel shall wear appropriate protective clothing to protect against burns and flashes. At a minimum, safety equipment for welders shall include:
    - Eye protection

- Hand protection
- Ear protection

In addition to the minimum, body protection (leather uppers and apron) may also be used.

E. Pressure gauges shall be monitored at all times during entire operation.

3.6 REQUIREMENTS

A. Field welding shall be done only by qualified welders using one or more of the API qualified weld procedure, **Section D-4**.

B. Welding shall not be done when the quality of the completed weld may be impaired by the prevailing weather conditions, including airborne moisture, blowing sand, or high winds. The field supervisor, or welder shall decide if weather conditions are suitable for welding.

C. Pipe welding, (butt welds) up to and including 8" IPS, will be done by the arc welding process.

D. Short sections of pipe, such as those needed for tie-ins or to facilitate back welding should be at least 1 pipe diameter in length.

E. Visual Inspection of **all** production welds shall be conducted by individuals qualified by appropriate training or experience to ensure that the welds are of high quality and that the welding is performed in accordance with the welding procedures.

F. Nondestructive testing:

a. Shall be required over entire circumference of pipe, for pipelines 6 inches in diameter and greater to be operated at pressures that produce a hoop stress of 20% or more of SMYS

   i. Class location 1, Minimum 10%
   ii. Class location 2, Minimum 15%
   iii. Class locations 3 and 4, railroad, river and highway crossings, 100% unless impractical in which case a minimum of 90% is required
   iv. Tie-ins, 100 %
   v. Records shall be retained for the life of pipeline

b. Shall **not** be required:
   i. Where welds have been visually inspected by a qualified individual and,
   ii. Pipeline is less than 6" in diameter
   iii. Pipelines is operated at a pressure that produces a hoop stress of less than 40% SMYS, and the number of welds are so limited that nondestructive testing is impractical

G. The criteria for visual, destructive and nondestructive inspection shall be the requirements set forth by Section 9 of the API 1104 Standards.

3.7 SEGMENTS

Factory-wrought steel welding elbows or transverse segments cut from the elbows may be used for all angles in steel pipe. Segments shall be cut perpendicular to the tangent of the welding elbow. The arc length measured along the crotch of transverse segments of welding elbows shall be at least 1" on pipe sizes 2" - 8". The minimum segment size for each diameter welding elbow is shown in Table 2.

TABLE 2

Minimum Welding Elbow Segment Size *

Nominal Diameter Inches)	Minimum Arc Length (Degrees)
2	32
3	21
4	16
6	11
8	8

* Based Upon: 1" along crotch on sizes 2" - 8"

The elbow selected for use shall have a design pressure equal to or greater than the intended operating pressure of the piping system.

Welding elbows and segments whose nominal wall thickness is different than the wall thickness of the pipe or fitting to which they are to be joined shall meet the end preparation requirements of this section.

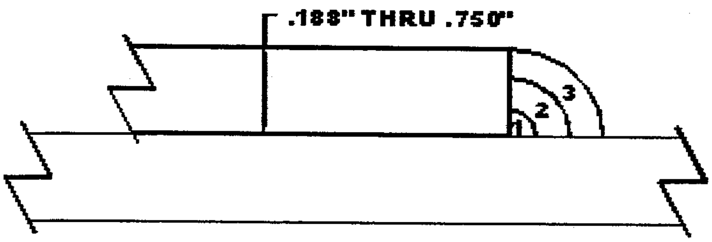
Shield Metal Arc Welding
Procedure No. 39

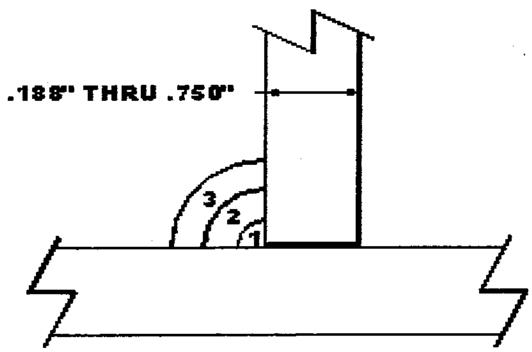
	Variables	Essential	Non Essential
A	Process	Manual	
B	Material	42,000# and under	
C	Outside Diameter	2.375" Through 12.750"	
D	Wall Thickness	.188" through .750"	
E	Filler Metal	First 2 Passes Group 1; Remaining Passes Group 2	
F	Position	Fixed	
G	Direction	Downhill	
H	Time Between Passes	Completion of root bead and start of 2nd bead, **Maximum 5 minutes**	Maximum of 36 hours to completion of weld
I	Shielding Flux	Cellulose	
J	Travel Speed	6 - 16 IPM	
K	Polarity	DCRP	
L	Clean / Grind		Hand or Power Tools

Lineup Clamps	N/A		
Preheat Pipe or temp below 40 F	Oxy/Arc or propane Torch	Preheat to at or above 150 F	Use Temp stick or Pyrometer

Electrode Size and Number of Beads

Minimum # of Beads and Sequence	Electrode Size and Type	Voltage	Amperage
1			
Root Bead	3/32" E6010/E7010	15-35	40-70
2	1/8" E6010/E7010	16-40	75-130
Hot Pass	5/32" E6010/E7010	17-40	90-175
3	1/8" E8010	15-35	70-140
Fillers (when needed)	5/32" E8010	16-40	80-190
Cap	3/16" E8010	17-40	130-240





Welder Anthony P. Barber
Tested By Jay K. Tuttle Date 7/16/2001
Approved By Darren S. Fox Date 7/16/2001

Sunrise Engineering, Inc.

PROCEDURES
STEEL PIPE ELECTRIC ARC WELDING - PROCESS

4.0 PURPOSE

All welding to be performed on the Operator's natural gas facilities shall be performed by qualified welders and shall conform to the following qualified Shielded Metal Arch Welding (SMAW) procedures:

4.1 SCOPE

Procedure No.	Shield Metal Arc Welding Procedure Description
1	Butt/Fixed /Cellulose - 42,000# and under - less than 2.375 - .188 through .750
2	Butt/Fixed /Cellulose - 42,000# and under - 2.375 through 12.750 - .188 through .750
3	Butt/Fixed/Cellulose - above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
4	Butt/Fixed/Cellulose- 42,000# and under - 2.375 through 12.750 - .188 through .750 - Back Weld
5	Butt/Fixed/Cellulose - 42,000# and under welded to above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
6	Butt/Fixed/Cellulose - above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750 - Back Weld
7	Butt/Fixed/Cellulose - 42,000# and under welded to above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750 - Back Weld
8	Butt/Fixed/Cellulose- 42,000# and under - less than 2.375 - .188 through .750
9	Butt/Rolled/Cellulose - 42,000# and under - 2.375 through 12.750 - .188 through .750
10	Butt/Roller/Cellulose - above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
11	Butt/Rolled/Cellulose - 42,000# and under welded to above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
12	Butt//Fixed/Low Hydrogen - 42,000# and under - less than 2.375 - .188 through .750
13	Butt//Fixed/Low Hydrogen - 42,000# and under - 2.375 through 12.750 - .188 through .750
14	Butt//Fixed/Low Hydrogen - above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
15	Butt//Fixed/Low Hydrogen - 42,000# and under welded to above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
16	Fillet/Rolled/Cellulose/Non-Beveled - 42,000# and under - less than 2.375 - .188 through .750
17	Fillet/Fixed/Cellulose/Non-Beveled - 42,000# and under - less than 2.375 .188 through .750
18	Fillet/Fixed/Cellulose/Non-Beveled - 42,000# and under - 2.375 through 12.750 - .188 through .750
19	Fillet/Fixed/Cellulose/Non-Beveled - above 42,000# up to and including 60,000# -

PROCEDURES
STEEL PIPE ELECTRIC ARC WELDING - PROCESS

	2.375 through 12.750 - .188 through .750
20	Fillet/Fixed/Cellulose/Non-Beveled - 42,000# and under welded to above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
21	Fillet//Rolled/Cellulose/Beveled - 42,000# and under - less than 2.375 - .188 through .750
22	Fillet/Fixed/Cellulose (2)-Low Hydrogen (1+)/Non-Beveled - 42,000# and under - 2.375 through 12.750 - .188 through .750
23	Fillet/Fixed/Cellulose (2)-Low Hydrogen (1+)/Non-Beveled - above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
24	Fillet/Fixed/Cellulose (2)-Low Hydrogen (1+)/Non-Beveled - 42,000# and under welded to above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
25	Fillet/Fixed/Cellulose/Beveled - 42,000# and under - less than 2.375 - .188 through .750
26	Fillet/Fixed/Cellulose/Beveled - 42,000# and under - 2.375 through 12.750 - .188 through .750
27	Fillet/Fixed/Cellulose/Beveled - above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
28	Fillet/Fixed/Cellulose/Beveled - 42,000# and under welded to above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
29	Fillet/Fixed/Low Hydrogen/Non-Beveled - 42,000# and under - less than 2.375 - .188 through .750
30	Fillet/Fixed/Low Hydrogen/Non-Beveled - Non-Beveled - 42,000# and under - 2.375 through 12.750 - .188 through .750
31	Fillet/Fixed/Low Hydrogen/Non-Beveled- above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
32	Fillet/Fixed/Low Hydrogen/Non-Beveled - 42,000# and under welded to above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
33	Fillet/Fixed/Low Hydrogen/Beveled - 42,000# and under - less than 2.375 - .188 through .750
34	Fillet/Fixed/Low Hydrogen/Beveled - 42,000# and under - 2.375 through 12.750 - .188 through .750
35	Fillet/Fixed/Low Hydrogen/Beveled - above 42,000# up to and including 60,000# - less than 2.375 - .188 through .750
36	Fillet/Fixed/Low Hydrogen/Beveled- above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
37	Fillet/Fixed/Low Hydrogen/Beveled - 42,000# and under welded to above 42,000# up to and including 60,000# - 2.375 through 12.750 - .188 through .750
38	Butt/Fixed/Cellulose – 42,000# and under – 2.375 through 12,750 - .188 through .750
39	Fillet/Fixed/Cellulose/Beveled – 42,000# and under – 2.375 through 12,750 – .188 through .750

4.2 WELDING PROCEDURES

Procedures developed and qualified by Sunrise Engineering, Inc. in conformance with API 1104.

PROCEDURES
STEEL PIPE / GAS FLOW CONTROL

5.0 PURPOSE

During installation and repairs to steel mains and services, the following approved methods may be used for safely controlling the flow of gas.

5.1 SCOPE

A. Squeezing
B. Valves
C. Stopple Fitting / Service Connection
D. Repair Clamps

5.2 SQUEEZING

Steel pipe (2" and less) - Hydraulic squeezer method may be used for controlling the gas flow for damaged steel pipelines 2" and less.

A cold squeeze shall not be reopened, but may be left in an active piping system provided the line is 2" or smaller, the Maximum Allowable Operating Pressure (MAOP) of the line is 125 psig or less, and reinforcement is installed.

A. Preparation - prior to squeezing, the following procedures should be followed:

1. Select a location remote from a gaseous area when possible

2. Clean the existing wrap, primer, rust and/or scale from pipe approximately 18" in length

3. Examine squeeze area for location of excessive pitting

4. Locate seam, if possible and mark with soapstone

5. Squeeze shall be at least one pipe diameter from any weld

B. Cold Squeezing Method

1. Assemble squeezer on pipe

2. Use approved grounding cables to control static electricity (Refer to Section B-6 of this Manual)

3. Open needle valve on squeezer.

4. Open the pump valve until the squeezer piston is fully retracted, then close the valve. Open vent on pump reservoir.

5. Place squeezer on pipe.

6. Insert the lower jaw through side rail slot with notches down until they fit over side rails.

7. Slide upper jaw through side rail slots over pipe all the way to the stop. Lock upper jaw in place.

8. Center squeezer over squeeze point, hold square to the pipe and operate pump slowly and with caution.

NOTE: **Squeezer without gauge must be used with caution to avoid squeezing the pipe in half. Apply only enough pressure to secure a squeeze shutoff.**

5.3 VALVES

Valves may be used for controlling the gas flow for damaged steel pipelines. Always gain supervisory approval before operating any valve to avoid possible customer outage.

Refer to Section G of this manual for detail procedures

5.4 STOPPLE FITTINGS

For steel main lines sizes 1" through 8" gas flow may be controlled by use of existing or installed line stopper fittings. For services, the service-to-main connection may be used to control gas flow.

A. Fitting type can be selected with the following considerations:
- Safety
- Pressure ratings

- Economics

B. When replacing a section of main using one or more line stopper fitting(s), all line stopper fittings shall be welded and operated by qualified personnel only.

- Select location for installing fitting or fittings on main
- If pipe is leaking, make temporary repair or select location out of gaseous atmosphere
- Fitting(s) should be installed on clean pipe that is free of corrosion or excessive pitting
- It is recommended that fittings should be installed at least one pipe diameter from a weld. Fittings shall not be installed on a weld under any circumstance
- Follow appropriate procedures for controlling static electricity
- Flash bell hole before welding starts.

Refer to Section M of this Manual for detail procedures

5.5 REPAIR CLAMPS

Steel gas line leaks can be temporarily or permanently repaired by using the appropriate leak repair clamp. Refer to Manufacturers Guidance Manual or this section for procedures and the selection chart for various types of leak repair clamps with their pressure rating and size range. **Refer to section D–6 of this Manual for approved installation procedures**

5.6 BYPASSING

A. When a temporary bypass is required on a main or service, it should be in place and verified that its operational by use of purge stack, gauges, and placing a demand on the system before the existing line is taken out of service to avoid possible customer outage.

NOTE: When necessary, contact the Engineer to determine size of bypass needed.

5.7 SAFETY

A. Every effort shall be exercised to prevent entering area of blowing gas.

B. The preferred method to control escaping gas is to drop back a safe distance to control gas flow either be squeezing or by use of valves.

C. Should the situation require entering an area of escaping gas, the appropriate fire protection steps shall be implemented. **Refer to Section B-2**

PROCEDURES
STEEL PIPE REPAIRS

6.0 PURPOSE (192.309)

All known leaks and any imperfections or damages to the pipe metal affecting its serviceability for the use intended will be repaired or replaced. All repairs shall meet the following requirements as stated in the appropriate sections:

A. Testing, **Procedure H-3**

B. Cathodic Protection, **Section L**

C. Purging, **Procedure H-5**

D. Wrapping, **Section I**

6.1 SAFETY

Safety procedures shall followed whenever working in gaseous atmospheres. **Refer to Section B-6,** for procedure to be taken to prevent accidental ignition. Frequent review of that material is recommended.

Particular attention shall also be given to use of personal safety equipment. **Refer to Section B-2**.

6.2 REPAIR CLAMPS

Steel gas line leaks can be temporarily or permanently repaired by using the appropriate leak repair clamp.

A. Permanent Bolt-On Leak Repair Clamps

Steel gas lines 8" or smaller with intended operating pressure of 60 psig or less will be considered permanently repaired using the appropriate bolt-on clamp using the following guidelines:

1. Bolt-on clamps must pass a soap test.

2. All clamps shall be wrapped using Trenton Wax Wrap or other approved method.

3 Cathodic protection requirements should be verified.

B. Bolt-On Repair Clamp Installation Procedure

1. Clean all around pipe to bare metal at location where clamp is to be installed
2. Select clamp as shown on selection chart of this section
3. Select clamp wide enough to cover adjacent corrosion pits
4. Assure that gasket is properly placed and fitted
5. Lubricate gasket with a rubber lube solution or LPS #1 Lubricant
6. Attach approved ground strap
7. Center clamp over leak
8. If clamp has more than one bolt, tighten bolts evenly
9. Soap test to assure leakage has been stopped
10. Primer and wrap clamp and adjoining steel pipe

NOTE: Bolt-on clamps shall be considered temporary repairs when used for the following conditions:

1) Welds
2) Seams
3) Tears or deformed pipe
4) Weld ells

6.3 LINE STOPPER FITTINGS

All line stopper fittings shall be welded and operated by qualified personnel only. If main can not be shut down, install a bypass.

A. Select location for installing fitting or fittings on main.

1. If pipe is leaking, attempt to make temporary repair, or select a location for installation of the fitting that is out of the gaseous atmosphere

B. Install approved ground strap

C. Fitting(s) should be installed on clean pipe that is free of corrosion or excessive pitting

D. It is recommended that fittings should be installed at least one pipe diameter from a weld. Fittings shall not be installed on a weld under any circumstance.

E. Flash bell hole before welding starts.

Refer to Section M–1 for detailed procedures in using stopple equipment

6.4 VALVES

This procedure shall be used only when main can be shut down.

A. Close valve(s). **Refer to Section G for approved procedure for operation of valves**

B. Purge down section of line to be replaced.

C. Install new section line. **Refer to Section D-3 for welding procedures**

D. Purge new section through purge nipple. **Refer to Section H-5**

E. Line pack new section and soap test.

F. Restore new section back to operation.

6.5 PATCHES

A. Patches are not allowed on lines operating above a hoop stress of 20% of SMYS.

B. Patches shall be made of steel and have a design pressure at least equal to the design level of the pipe.

C. Patches shall be round or have corners with radius of not less than 1".

D. At least 3" of sound metal exists between the welds of adjacent patches fillet welds or bands.

E. The length of patch is not limited along the longitudinal axis of pipe.

6.6 SHIELDS AND SLEEVES

Shields and sleeves shall be made of steel and have a design pressure at least equal to the design level of the pipe. This method is used for the following types of repairs:

A. All types of leaks including corrosion, damage from external force, defective (including cracked) circumferential and longitudinal welds and cracked parent metal.

B. Corroded areas

C. Dents, when the stress at design level is below 20% of SMYS, and are less than 1/4" deep in pipe 8" or less in diameter.

E. Hard spots associated with other defects when stress at design level is less than 20% of SMYS.

F. Defect (but not cracked) circumferential welds including those on which unsuccessful repair attempts by grinding and re-welding have been made.

G. Welding bands, weld reinforcing sleeves, and canopies are to be installed so that the two halves fit together and fit around the pipe onto which they are to be welded. The gap at the root between the parts to be joined by welding shall not exceed 1/16" except at the longitudinal weld where the gap may be as much as 1/8".

6.7 GRINDING

The use of grinding as a method of repair is acceptable as long as the following conditions are met:

A. The entire imperfection (scratch, gouge, arc burn) is removed.

B. The remaining wall thickness, after grinding, must at least be equal to the nominal thickness required for the design pressure of the pipeline.

6.8 WELD REPAIRS

A. Defect in unacceptable welds may be repaired one time.

B. Each weld that is repaired must have the defect removed. Before welding has commenced, pipe should may be preheated between 300° F and 400° F.

C. The welding performed in making repairs shall be visually inspected. The weld repair shall meet the standards of acceptability of API 1104.

D. On existing lines operating at a hoop stress of less than 40% of SMYS welds may be repaired using a full encirclement weld reinforcing sleeve of appropriate design and using approved welding procedure.

E. Non-destructive testing involving repairs or cutouts shall consist of two X-rays, the first one showing the defect, and the second one showing the sound weld as accepted by a qualified welding inspector or supervisor.

6.9 ARC BURN

On line pipe, any arc burn outside the weld area that cannot be consumed by the finish weld shall be cut out.

In situations involving weld fittings such as valves, insulators, line stopper fittings, etc., it may be desirable to attempt a repair in an effort to salvage the fitting. Arc burns can be a serious defect regardless of size and should be treated as such. Arc burns may contain minute cracks hardly visible to the naked eye. These small cracks may be present in the arc burn or beneath the arc burn in the heat-affected zone.

The following is a step-by-step procedure for examining and repairing arc burns:

Step #1 - File down arc burn area blending it with the contour of the pipe until visual evidence of the arc burn is completely removed.

PROCEDURES
STEEL PIPE REPAIRS

Step #2 - Etch arc burn area with a 20% (by volume) solution of ammonium sulfate.

Step #3 - Visual inspection of the arc burn area should etch out to the same color. If evidence of any darkened areas is still present, repeat the above three steps.

Step #4 - Wash arc burn with water to dilute the enchant and to remove the residue of the enchant solution from the pipe surface.

Step #5 - Check arc burn area with a thickness gauge to see if the remaining wall thickness of the pipe meets the API requirements for which the pipe was manufactured and also meets the design criteria for which the pipe is being used.

If a repair is made by grinding, the arc burn must be completely removed and the remaining wall thickness must be at least equal to either:

A. The minimum wall thickness required by the tolerances in the specification to which the pipe was manufactured; or

B. The nominal wall thickness required for the design pressure of the pipeline.

Step #6 - Arc burn shall be cut out as a cylinder if the criteria in Step #5 is not met

Step #7 - Keep records on the location (Station Number) and amount of pipe wall removed, also X-ray number of welds.

PROCEDURES
STEEL PIPE REPAIRS

MUELLER® 520 AND 530 SERIES FULL-SEAL® STAINLESS STEEL PIPE REPAIR CLAMPS

Mueller Co. 12.1

11-9

Mueller 520 and 530 series Full-Seal Pipe Repair Clamps provide ecomomical repairs and resist corrosion

MUELLER Full-Seal Pipe Repair Clamps provide an economical repair for circumferential breaks or cracks, multiple leaks or holes in pipe. They are available in 5", 6", 7-1/2", 9", 10", 12", 15", and 18" lengths for cast iron, ductile iron, and standard steel pipe. Each clamp size can accommodate a wide range of O.D. variations.

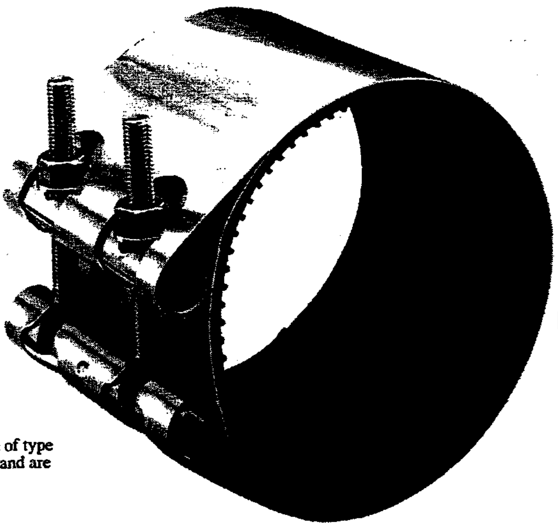
Lightweight all stainless steel clamps resist corrosive atmospheres and hot soils. Available in single-section Full-Seal® style (Series 520), in two-section Xtra-Range® style(Series 530), and in Servi-Seal® style with welded-in service outlet. Servi-Seal style is available in either single-section (Series 521-529) or two-section (Series 531-539).

☐ UNIQUE LOW-PROFILE DESIGN— of the bolting mechanism makes clamp easy to handle, easy to fit around pipe.

☐ TAPERED END GRIDDED GASKET— is made of specially compounded rubber, has a gridded pattern for positive sealing and tapered ends to make installation quick and easy.

☐ HIGH STRENGTH STAINLESS STEEL BOLTS— have spin-fit threads, treated with an anti-galling agent, for fast installation — plus special tee-heads so they drop into bolt bar slots easily yet do not turn during tightening.

☐ STAINLESS STEEL BOLTING MECHANISM— is pre-assembled. Unique weight-saving Mueller design features lug and bolt bars which rotate as the clamp is tightened. This avoids bolt bending or binding, keeps tightening force close to the pipe surface and allows more efficient transfer of tightening force on the bolts to clamping force on the pipe.



☐ STAINLESS STEEL GAP BRIDGES— cemented to the gasket where the band sections join, to provide the 360° clamping pressure.

☐ MAXIMUM GAS WORKING PRESSURE—for properly installed clamps at 150° F. maximum working temperature: 2"-8" 100 psig, 10"-12" cast iron or ductile iron pipes 60 psig, 10"-12" steel pipes 100 psig.

☐ BANDS—are made of type 304L stainless steel and are machine-welded.

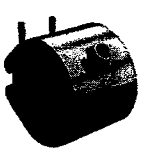
520 SERIES CLAMP

☐ Repair circumferential breaks, cracks

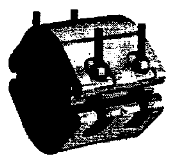
☐ Repair leaks and holes in pipe

☐ Repair longitudinal cracks

☐ Repair pulled services, broken pipe with Servi-Seal Clamp



SERVI-SEAL Clamp

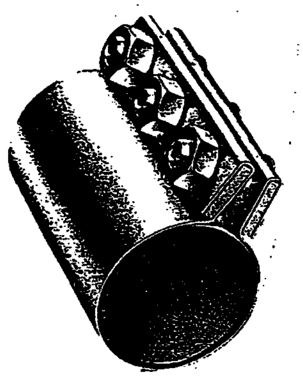


530 Series Clamp

PROCEDURES
STEEL PIPE REPAIRS

STYLE 3137 FULL CIRCLE

STAINLESS STEEL REPAIR CLAMPS



Carton Quantity 10

CATALOG NUMBER	IPS PIPE SIZE	LENGTH	NO. OF BOLTS	BOLT SIZE	PRICE
3137-15-0204	1-1/4"	4"	2	1/2" X 2"	20.85
3137-15-0306	1-1/4"	6"	3	1/2" X 2"	40.60
3137-15-0408	1-1/4"	8"	4	1/2" X 2"	44.30
3137-16-0204	1-1/2"	4"	2	1/2" X 2"	28.25
3137-16-0306	1-1/2"	6"	3	1/2" X 2"	40.90
3137-16-0408	1-1/2"	8"	4	1/2" X 2"	43.35
3137-17-0204	2"	4"	2	1/2" X 2"	28.50
3137-17-0306	2"	6"	3	1/2" X 2"	40.75
3137-17-0408	2"	8"	4	1/2" X 2"	48.45
3137-18-0204	2-1/2"	4"	2	1/2" X 2"	26.75
3137-18-0306	2-1/2"	6"	3	1/2" X 2"	38.50
3137-18-0408	2-1/2"	8"	4	1/2" X 2"	53.50
3137-19-0204	3"	4"	2	5/8" X 2"	32.75
3137-19-0408	3"	8"	4	5/8" X 2"	58.50
3137-19-0612	3"	12"	6	5/8" X 2"	71.25
3137-21-0204	4"	4"	2	5/8" X 2"	30.30
3137-21-0408	4"	8"	4	5/8" X 2"	65.50
3137-21-0612	4"	12"	6	5/8" X 2"	90.35
3137-23-0204	5"	4"	2	5/8" X 2"	41.85
3137-23-0408	5"	8"	4	5/8" X 2"	63.95
3137-23-0612	5"	12"	6	5/8" X 2"	84.85
3137-24-0204	6"	4"	2	5/8" X 2"	47.00
3137-24-0408	6"	8"	4	5/8" X 2"	73.30
3137-24-0612	6"	12"	6	5/8" X 2"	124.10
3137-26-0308	8"	8"	3	3/4" X 3"	94.90
3137-26-0410	8"	10"	4	3/4" X 3"	111.70
3137-26-0512	8"	12"	5	3/4" X 3"	145.15
3137-27-0308	10"	8"	3	3/4" X 3"	105.40
3137-27-0410	10"	10"	4	3/4" X 3"	125.70
3137-27-0512	10"	12"	5	3/4" X 3"	144.00
3137-28-0308	12"	8"	3	3/4" X 3"	117.35
3137-28-0410	12"	10"	4	3/4" X 3"	127.80
3137-28-0512	12"	12"	5	3/4" X 3"	184.00

ITEM: STAINLESS STEEL REPAIR CLAMPS, Style 3137

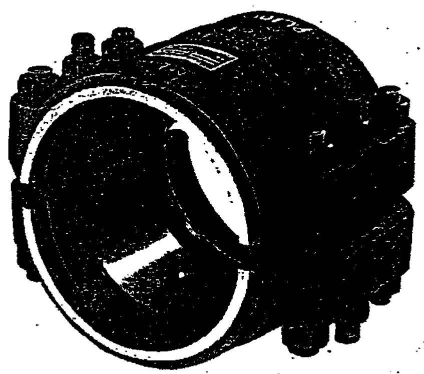
STOCK NO.	PART NUMBER	DESCRIPTION	APPROVED MANUFACTURER
13010	3137–16–0306	1 1/2 x 6	Continental
13030	3137–17–0306	2 x 6	Continental
13050	3137–21–0408	4 x 8	Continental
13070	3137–24–0408	6 x 8	Continental

DATE: 3/4/96 APPROVED BY: SW

PROCEDURES
STEEL PIPE REPAIRS

PLIDCO® SPLIT+SLEEVE

Plidco Split+Sleeves are used for making permanent repairs to a variety of pipelines while the line continues on stream.



ITEM: Split Sleeve with Buna N Packing

STOCK NO.	PART NUMBER	DESCRIPTION	APPROVED MANUFACTURER
13130	SSO-060018	6"x18", 1000 wp, 12 sa,	Plidco
		dr 769	

DATE: 3/4/96 APPROVED BY: SW

PROCEDURES
STEEL PIPE SERVICE TEES

7.0 STEEL TAPPING TEES

The purpose of this section is to identify tapping tees approved for use in the Operator's gas system.

7.1 MUELLER SERVICE TEE

This procedure presents the method used for the installation of the Mueller service tee on a steel main.

A. Installation - Tee on Main

1. Clean the main of all coatings, rust, scale, dirt, etc., in the area where the service tee is to be welded to the main.
2. Remove completion plug and place these parts in an area where they will remain clean.
3. Replace cap. Attach the tee body to the main utilizing approved welding procedures.

B. Installation - Steel Service Piping and/or transition fitting

1. Attach service piping to the tee utilizing approved welding procedures
2. Let the weld and the tee cool naturally to the ambient temperature.
3. Pressure test the installation in accordance with CS H-3.

C. Tapping

1. Attach the proper valve or control chamber. Check the operation of the valve by cycling fully and counting the turns.
2. Measure and record the travel distance for the tap.
3. Install the proper drill, attachments and fittings to the drilling machine. Coat the drill thoroughly with Mueller cutting grease.

4. Retract the boring bar to its uppermost position and install the drilling machine on the valve. Fully open the valve while supporting the boring bar to prevent damage to the valve.

5. Drill the main:

   (a) Slowly advance the boring bar until the point of the drill contacts the main.

   (b) Adjust the feed tube and the yoke so the yoke engages the collar on the boring bar. Tighten the clamping collar against the feed yoke.

   (c) Drill the hole by operating the ratchet handle clockwise and turning the handle clockwise a little at a time. Continue drilling until the main is perforated by the drill. Do not exceed the marked, predetermined travel distance.

   (d) When the drilling operation is complete, retract the boring bar to its uppermost position and fully close the valve.

   (e) Purge the drilling machine and connect jumper cables prior to removing the machine from the valve.

D. Completion

1. Install the proper attachments and fittings on the drilling machine.(the drilling machine serves as the completion unit)

2. Attach the completion plug to the drilling machine.

3. Retract the boring bar to its uppermost position and install the drilling machine on the valve using jumper cables.

4. Advance the boring bar until the plug contacts the first thread in the tee body. Hold the boring down with the yoke if desired.
5. Rotate the boring bar clockwise until the plug seats firmly in the tee body.

6. Once the plug has seated, release it by rotating the boring bar counter-

clockwise until the inserting tool is free from the EZ release adapter. To release the plug, it may require a sharp blow with the hand in a counter-clockwise direction to break the EZ release adapter free.

7. Purge the drilling machine to verify that the plug has seated properly. If gas is escaping from the valve, it will be necessary to rotate the boring bar back in a clockwise direction to seat the plug tighter.

8. After the plug is properly seated and released, the drilling machine and valve may be removed.

    (a) The EZ adapter will prevent the valve from being closed at this point.

    (b) Use grounding cables when removing the drilling machine.

9. Lubricate the “o”- ring if applicable.

10. Install the completion cap per the manufacturer’s procedure.

PROCEDURES
THREADED JOINTS ON STEEL PIPE

8.0 PURPOSE

This section presents the procedure for fabricating gas tight threaded connections that will sustain the longitudinal pullout or thrust forces caused by contraction or expansion of the piping or by anticipated external or internal loading.

Each threaded joint shall be made in accordance with this procedure.

8.1 GENERAL

Threaded joints are intended for above ground installations and **shall not** be buried.

8.2 PROCEDURE

All threaded pipe and fittings purchased or fabricated for utilization on the Operator's pipeline facilities shall use the American National Standard Thread (NPT).

A. Maximum size for pipe and associated fittings to be joined using the threaded procedure shall be 4".

B. Pipe and fitting threads shall be inspected prior to assembly for gouges, nicks, missing or malformed threads, or any other defect that would affect the integrity of the joint.

C. Pipe thread sealant shall be of an approved type. It shall be applied to the male threads only on pipe sizes up to and including 1½" and to both the male and female threads for pipe sizes larger than 1½". Care must be taken to avoid getting excess sealant inside the pipeline at all times.

D. After inspecting and applying sealant to the pipe threads, the joint shall be made up wrench tight to produce a gas tight seal.

E. Prefabricated facilities should incorporate at least one flanged fitting, or union to accommodate future work on the facility. (Only above ground facilities)

F. Test the completed joint in accordance with **Section H-3**.

PROCEDURES
FLANGED JOINTS IN STEEL PIPE

9.0 PURPOSE

This section presents the procedure for fabricating gas-tight flanged joints.

Each new facility installation in which a flanged joint is to be incorporated shall comply with engineering specifications detailing the proper design and fabrication of the flanged connections being assembled.

When assembling flanged connections to which no engineering specifications are available, the following procedure shall be utilized.

9.1 GENERAL

A. Flanges shall be used to facilitate installation and removal of pipe, fittings or equipment in facilities in **above ground** installations.

B. Weld neck and blind flanges will be used for natural gas piping.

C. The ends of bolts shall extend completely through the nuts with at least one thread on the bolt showing from each nut, unless the body design does not allow the bolt to protrude enough for one thread to show.

D. Standard wall thicknesses of the flange hub at the weld bevel are provided in Table 5. Flanges <u>shall not</u> be taper bored. It is recommended to use pipe of the same wall thickness or within 3/32" for fabricated assemblies. Back welding and transition segments are acceptable.

E. Recommended bolt sizes for standard and insulating flanged connections are shown in Tables 1, 2, 3, and 4. The bolt lengths shown may be greater than those found in other sources to allow for thicker gaskets and to allow at least one thread showing on each end of stud bolts. Machine bolts may be on ANSI 150 steel flanges up to and including 8" flanges, unless required to connect to a valve or fitting. Stud bolts may be used for all flanges.

F. When flanged connections are made to fittings or valves, consideration shall be given to non-standard bolting requirements, such as cap screws or changes in bolt lengths due to flange thickness or clearance behind the flange. Non-standard items may be used where necessary. **A minimum of one thread must extend beyond the nut.**

G. Ring gaskets are for use with raised-face flanges only.

H. Only steel flanges and steel stud bolts will be used in following applications:

1. Bridge crossing and spans.

2. Areas of known unstable ground or significant vibration.

I. Documentation. The as-built information will show the flange specification.

J. All bolts and studs and nuts to be utilized shall be new.

9.2 PROCEDURE

A. All components and materials to be installed while assembling the flanged joint should be suitable for the intended application.

B. The sealing surface area of the flange should be inspected and cleaned of dirt, old gasket material, worn or plugged serrations, gouges or nicks, paint, and any other defect that could affect the integrity of the joint.

C. The bolts should be clean, lubricated with an approved thread lubricant, and free of burrs or any other defects that could affect the integrity of the joint.

D. The gasket should be inspected for dirt, gouges, or any other defect that could affect the integrity of the joint.

E. Assembly

1. Install the gasket on the gasket seating surface and bring the cover flange in contact with the gasket.

2. Install all bolts, making sure they are clean and well lubricated with an approved lubricant.

3. Run-up all nuts finger tight.

4. Develop the required bolt stress in a minimum of four steps, following a tightening sequence (see Figure 1). It is important that no more than 30% of the required bolt stress is achieved on the initial set. Should this occur, serious damage can be inflicted to the gasket and subsequent tightening cannot offset the damage. After following this sequence, a final tightening should be performed in a bolt-to-bolt pattern to ensure that all bolts are evenly stressed.

   In the absence of assembly torque specifications the bolts may be torqued to a stress level of 45,000 psi or 50% of their yield strength.

F. The final installation shall be tested in accordance with **Section H-3**.

PROCEDURES
FLANGED JOINTS IN STEEL PIPE

TABLE 9-1

RECOMMENDED BOLT SIZE AND TORQUE SETTINGS FOR
CLASS 125 CAST-IRON OR 150 ANSI STEEL FLANGES

Pipe Size Inches	No. Bolts Req'd	Bolt Diameter Inches	Bolt Type	Bolt Length Inches		Torque Specifications	
				Standard	Insulating	Mach 25,000	Stud 45,000
				Raised or Flat Faces		(ft lbs)	(ft lbs)
1	8	1/2	Mach Stud	2 1/4 2 3/4	2 1/2 3	20	45
1 1/2	4	1/2	Mach Stud	2 1/2 3	2 3/4 3 1/4	20	45
2	4	5/8	Mach Stud	2 3/4 3 1/4	3 3 1/2	40	90
3	4	5/8	Mach Stud	3 1/4 3 3/4	3 1/2 4	40	90
4	8	5/8	Mach Stud	3 1/4 3 3/4	3 1/2 4	40	90
6	8	3/4	Mach Stud	3 1/2 4	3 3/4 4 1/2	80	150
8	8	3/4	Mach Stud	3 3/4 4 1/4	4 4 3/4	80	150
10	12	7/8	Stud	4 3/4	5	125	240
12	12	7/8	Stud	4 3/4	5 1/4	125	240
16	16	1	Stud	5 1/2	5 3/4	185	370
18	16	1 1/8	Stud	6	6 1/2	265	530
20	20	1 1/8	Stud	6 1/4	6 3/4	265	530
22	20	1 1/4	Stud	6 3/4	7 1/4	375	750
24	20	1 1/4	Stud	7	7 1/4	375	750
26	24	1 1/4	Stud	7 1/4	7 1/2	375	750

PROCEDURES
FLANGED JOINTS IN STEEL PIPE

TABLE 9-2

RECOMMENDED BOLT SIZE AND TORQUE SETTINGS FOR
CLASS 250 CAST-IRON OR 300 ANSI STEEL FLANGES

Pipe Size Inches	No. Bolts Req'd	Bolt Diameter Inches	Bolt Type	Bolt Length Inches – Raised Faces: Standard	Bolt Length Inches – Raised Faces: Insulating	Torque Specifications 45,000 Stud
2	8	5/8	Stud	3 1/2	3 3/4	90
3	8	3/4	Stud	4 1/4	4 3/4	150
4	8	3/4	Stud	4 1/2	5	150
6	12	3/4	Stud	5	5 1/4	150
8	12	7/8	Stud	5 1/2	6	240
10	16	1	Stud	6 1/4	6 3/4	370
12	16	1 1/8	Stud	6 3/4	7 1/4	530
16	20	1 1/4	Stud	7 1/2	8	750
18	24	1 1/4	Stud	7 3/4	8 1/4	750
20	24	1 1/4	Stud	8 1/4	8 1/2	750
22	24	1 1/2	Stud	9	9 1/4	1380
24	24	1 1/2	Stud	9 1/4	9 1/2	1380
26	28	1 5/8	Stud	10 1/4	10 1/2	1675
30	28	1 3/4	Stud	11 1/2	11 3/4	2190
34	28	1 7/8	Stud	12 1/2	13	2190
36	32	2	Stud	13	13 1/2	3300

PROCEDURES
FLANGED JOINTS IN STEEL PIPE

TABLE 9-3

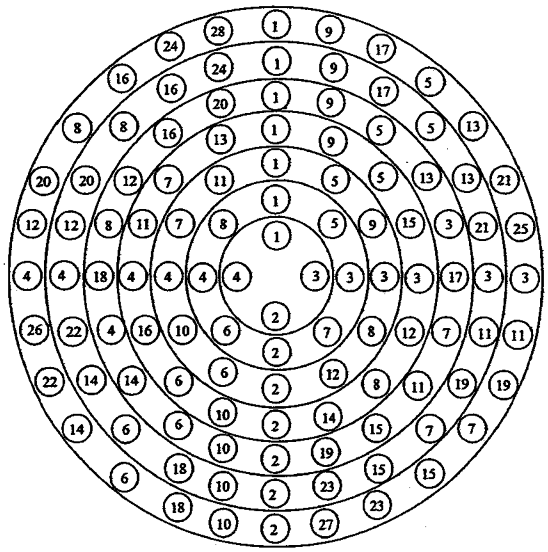
WELD NECK FLANGES

Nominal Size (Inches)	Wall Thickness Flange Hub at Bevel	
	ANSI 150 & 300	ANSI 400 & 600
2	.154	.218
3	.216	.300
4	.237	.337
6	.280	.432
8	.322	.500
10	.365	.500
12	.375	.500
16	.375	.500
20	.375	.500
24	.375	.500

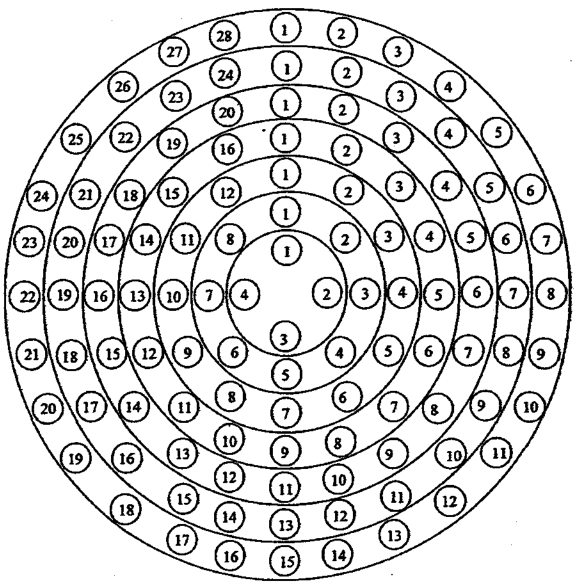
PROCEDURES
FLANGED JOINTS IN STEEL PIPE

FIGURE 9-1

Sets 1-3
Torque Set Sequence



Final Set
Torque Set Sequence



PROCEDURES
FLANGED JOINTS IN STEEL PIPE

TABLE 9-4

FLANGE PRESSURES

Material	Class	Max. Test Pressure psig
Cast Iron	125	275
Cast Iron	250	600
Steel	ANSI 150 lbs	425
Steel	ANSI 300 lbs	1100
Steel	ANSI 400 lbs	1450
Steel	ANSI 600 lbs	2175
Steel	ANSI 900 lbs	3250

PROCEDURES
STEEL PIPE CLEANING/PIGGING

10.0 PURPOSE

After testing a newly installed steel main 4" or greater in size, the gas pipeline will be flushed clean to remove of all dirt, rust, construction debris, water, and drying agents before being placed in service.

Cleaning (drying) shall be accomplished by pneumatically propelling pipeline pigs down the pipe tube. The pigs shall be introduced into the pipeline by means of a launching device.

10.1 PROCEDURE

The following general cleaning procedure shall be accomplished:

- Pig the pipeline with foam pigs until dry.
- Pig the pipeline with brush pigs to scrape and remove all mill scale, rust, and debris.
- Pig the pipeline with foam pigs until a ¼" or less of dust residue had penetrated the foam pig.

10.2 EQUIPMENT

Pigging shall be done with equipment that is capable of providing (blowing) -70°F dew point, dry air.

The cleaning pig shall be constructed of a flexible, polyurethane, (open cell) ester type foam. Drying types shall weigh approximately 2 lbs/cu.ft. The density of wiping and scraping type pigs shall be 8-10 lbs/cu.ft.

The cleaning pigs are to have a dished base and parabolic nose and have a length of approximately two times its normal diameter.

The cleaning pigs shall have the ability to negotiate short radius bends, ells, tees, and reduced port valves.

The cleaning pig for drying shall have a flexible seal composed of polyurethane on its tail.

10.3 SAFETY

Extreme caution shall be exercised when propelling pigs with compressed gasses as the pig may act as a projectile when exiting the pipeline.

10.4 PIPELINE CLEANING PLAN

Before cleaning and pigging any section of pipeline, a specific pipeline cleaning procedure (including pigs and equipment to be used) shall be developed and reviewed by the Operator.

PROCEDURES
STEEL PIPE PREFABRICATED RISER

11.0 PURPOSE

Either prefabricated steel risers or anodeless risers may be used.

11.1 PREFABRICATED RISER

A. Prefabricated risers shall be properly bent without causing a wrinkle bend and shall not contain a threaded or flanged joint.

B. Riser shall be 8" to 12" from the building or structure to which it serves.

C. When a steel riser is connected to a plastic service, locator rise shall not be electrically connected to the riser.

D. The locator wire shall be tied to the riser below the stopcock. **Not Cad welded**

E. Sleeves, when required, are to be installed so that the top of the sleeve is approximately 6" below bottom of stopcock and above finished grade.

F. **Refer to section L-7 for proper wrapping procedure**

PROCEDURES
MAIN AND SERVICE INSTALLATIONS / GENERAL

1.0 PURPOSE (192.301 – 192.143)

It is the purpose of this section to provide minimum requirements and information on the methods for the installation, extension, and abandonment of mains.

1.1 SCOPE

This section covers the following:

A. Installation Requirements
B. Methods of Installation
C. Back-fill and Compaction Requirements
D. Casings and Sleeving
E. Abandonments and Reinstatements
F. Locator Wire
G. Caution Tape
H. Pipe Bending
I. Records

1.2 GENERAL

A. Mains

1. Mains should be run parallel to the street or highway centerline, and in the location specified on the approved design plans.
2. Mains shall not be run through manholes or footings, but shall be offset around them.
3. Offsets in mains should preferably be made at a 45-degree angle, although a 90-degree offset may be used where field conditions require.
4. Mains should be installed in such a manner as to minimize any stress induced by construction and protect the pipe against damage.

B. Services

1. Residential service lines will have an excess-flow valve installed on the service line.
2. Commercial and industrial service lines will have a property line valve installed on service facilities when the service shutoff adjacent to the **MSA**

will not be, or is not readily accessible for emergency use.

NOTE: A facility can be considered a readily accessible location if, in an emergency situation, access can be gained 24 hours a day on any given day. Access arrangements can include the use of an Operators lock, an interlock arrangement with another entity, the use of bolt cutters to cut off locks, etc. If extraordinary means for gaining access are necessary, such as damaging structures (other than removing locks) or having to request access from another individual, a service shutoff valve should not be considered accessible.

3. Installation of services under paving, when the paving is continuous between structures, should be avoided whenever possible. If unavoidable, a sleeve shall be installed around the riser at ground level to allow venting. Existing risers encased in paving should be sleeved when the service line is repaired or replaced. **Refer to Section E-6**
4. Polyethylene stubs are extended by squeezing off the pipe approximately one foot from the end cap. (**Refer to Section C-8**.) After the balance of the service has been leak tested, the tie-in connection shall be made and then soap tested at line pressure.
5. Risers, while not in use, shall have the lock wing cock in the off position, locked and plugged.
6. Risers shall be installed in locations consistent with those specified under **Section F-2.**

C. Mains and Services shall be tested in accordance with **Section H-3**.

D. Under no circumstances may a main or service line run under a building. For building encroachments over a pipeline, the Operator will require the property owner to resolve the encroachment (i.e. move the building, or reimburse the Operator for the full cost of relocating the pipeline) The Operator will discontinue service to the customers for which the encroachment issues are not resolved.

E. All property corner markers, survey monuments, construction staking, archeological antiquities, mining claim monuments, etc., will be protected from damage. In the event of uncovering archeological antiquities, stop work (unless in an emergency situation), and report findings to the supervisor immediately. Restoration is required if removal is necessary, unless previous arrangements have been made.

1.3 INSTALLATION RECORDS

A. Installation records for all gas pipeline and pipeline facilities shall be maintained for the useful life of the facility.

B. Records and Maps shall include the following:
1. Size and type of all pipe and appurtenances
2. Location including measurements from landmarks such as centerline, property line, milepost, stationing, etc….
3. Type and location of tie-in
4. Test record
5. Sleeve or casing location and type
6. placement of locator wire and caution tape

C. Installations involving steel pipe shall include the following additional information:
1. Grade and wall thickness
2. Specific rating of valves and other appurtenances
3. Weld procedure utilized
4. Location of welds and non-destructive tests performed
5. Cleaning / pigging and purge procedures utilized and results

PROCEDURES
INSTALLATION REQUIREMENTS

2.0 PURPOSE

The purpose of this section is to establish the minimum requirements for which to install mainline and service line piping.

2.1 SCOPE

A. Depth/Cover

B. Bedding & Shading

C. Clearance

2.2 MAIN & SERVICE REQUIREMENTS

A. The depth to which pipe must be installed is termed cover. Cover is defined as the distance from the top of the pipe to the finished grade. When pipe is crossing a gutter or drainage area, the distance is measured to the bottom of the channel.

Distribution Main

Location	Normal Depth	Minimum Depth
Street/Right-of-Way	30 inches	24 inches
Other	30 inches	24 inches

Distribution Service

Street/Right-of-Way	24 inches	18 inches
Private Property	24 inches	18 inches

B. Trench bottoms should be smooth and free of rocks and debris that could damage the pipe. Bedding material should be used where rocky areas exist. The pipe must be continuously supported on undisturbed or well compacted soil or bedding material. All pipe must be padded a minimum of 6" under the pipe and shaded a minimum of 6" over the pipe.

C. Bedding and shading material shall be smooth, free of rocks and able to sift through a

½" screen.

D. Pipe shall not be installed against the trench wall. A minimum distance of 1" clearance shall be maintained between the pipe and trench wall. This will allow shading material to fill the void between the pipe and the trench wall.

E. There shall be a minimum clearance, both vertical and horizontal, of 8", 12" is recommended wherever possible, between the gas main and any underground utilities that are parallel with the gas facilities. There shall be a minimum clearance of 2", 12" wherever possible, between the lateral crossings of gas mains and other utilities. Less than 8" clearance is allowed if gas lines are protected by a sleeve, but gas lines must never come in contact with other underground utilities.

F. In excavations which employees may be required to enter, excavated or other material shall be effectively stored and retained at least two feet or more from the edge of the excavation.

G. While lowering pipe into an excavation, care must be taken to avoid any damage to the pipe.

H. All piping and tubing shall be carefully visually inspected for cuts, gouges and deep scratches before installation.
NOTE: All harmful imperfections shall be cut out. (192.305 & 192.307)

I. Trenched located on steep grades may be subject to water penetration resulting in possible erosion of the trench. When such potential exists, trench breaks shall be installed. **Refer to Section E-5**

J. In the case of Plastic pipe installations a locator (Tracer) wire shall be installed

2.3 SERVICE AND TAP TEES

A. Service tees shall be installed on top of the main whenever possible.

B. The service tee shall have a minimum of 24" of cover, measured from the completion cap, whenever possible

C. Caution shall be exercised during backfill to prevent undue torsional loading on the tee which may cause damage to the tee or mainline.

D. PE service tees and tap tees may have a protective sleeve covering the connection of the tee to the service or main.

PROCEDURES
METHODS OF INSTALLATION

3.0 PURPOSE

Three methods of installation are presented in this section. The installation methods are open trench, joint trench and bore.

Every effort will be made to protect customer property and vegetation from undue damage.

3.1 SCOPE

A. Open Trench

B. Boring

C. Common Trench

3.2 OPEN TRENCH

The majority of Operators pipeline installations are made in open trench excavations. This section outlines the procedure to be followed during excavating.

A. Preparation

1. The size and depth of the excavation will be determined by the nature of the job; however, the overall objective shall be to make the excavation as small and shallow as will permit the job to be safely and efficiently completed.
2. Field crews shall not start excavations or pavement cuts until the best location for the installation has been obtained from the available data.
3. All underground utility structures and obstructions should be located, marked and exposed ahead of trenching and digging equipment. Adequate and proper support shall be provided for other structures encountered in order to eliminate the possibility of resulting damage.
4. Trench bottoms should be smooth and free of rocks and debris that could damage the pipe or tubing. The pipe or tubing must be continuously supported on undisturbed or well compacted material.
5. Bedding material shall be used where rocky areas exist.

B. Barricading

Effective barricading is the primary means of both protecting the crew members at all

construction sites and protecting the public from hazards incurred by the excavations. The crew leader will be responsible for placing barricades, signs, flagman, etc., in compliance with the governing body to:
1. Maintain as free a flow of traffic as practical.
2. Protect the crew from traffic.
3. Protect motorists and pedestrians.
4. Protect excavations, which are left open and unattended during darkness.

C. Drainage
1. During wet weather, provisions must be made for proper flow of drainage water. The flow of water should be directed to follow its natural course and away from the trench. Implement Best Management Practices (BMP's).
2. Drainage runoff should not be allowed to accumulate in an excavation.

D. Sloping and Shoring
1. Shoring or sloping the sidewalls of the trench or excavation is required under certain conditions to the protect individuals entering the excavation from cave-ins and personal injury
Refer to Section B-8.

3.3 COMMON TRENCH

This section provides the specifications that will meet Operator requirements for providing a trench, which would accommodate gas mains and other utilities. Gas mains may be installed with other utilities provided the trench is located within a dedicated street or recorded easement. The gas mains may be installed in a joint trench with the following utilities: electric, primary or secondary telephone, television or water, provided the stated clearances are maintained.

Gas lines installed in the same trench as sewer lines should be avoided. When this is not possible a minimum vertical clearance of 24" should be maintained between the gas line and sewer line. The sewer line must be on the bottom.

A. Installation Procedure
1. All trench depths shown on Figures 1 through 3 will be from finished or final grade.
2. There shall be a minimum clearance, either vertical or horizontal, of 8" between the gas main and any underground utilities that are parallel with

Operator facilities. There shall be a minimum clearance of 8", 12" wherever possible, between the lateral crossings of gas mains and other utilities. This applies to all crossings of other utilities. Less than 12" clearance is allowed if gas lines are protected by a sleeve, but gas lines and sleeves must never come in contact with other underground utilities.

3.4 BORED

A. Installation

This section presents the methods for bore installation.

1. Prior to any boring operations, all underground structures should be located and exposed where necessary. Site holes shall remain open throughout the entire bore process to ensure safe installation is completed.
2. There shall be a minimum clearance, either vertical or horizontal, of 8", 12" wherever possible, between the gas pipe and any other underground utilities.
3. The section of existing main should generally be located and exposed prior to boring. The bell hole at the main should be of sufficient size to allow for the tie-in.
4. Bore pits should be spaced so as to permit the job to be efficiently completed.
5. The borehole should be reamed to provide easier pipe installation.
6. When wrapped pipe is to be installed in a bore, care must be exercised to prevent damage to the coating during installation.
7. Installation of polyethylene pipe by the boring method, where soil conditions do not meet the requirements of **Section E-5** for bedding and shading material must be inserted in a protective sleeve. **Refer to Section E-6, Sleeving Requirements**
8. Precautions shall be taken to prevent damage or undue stress on plastic pipe when the pipe is pulled through a bore with the aid of a bore machine or other mechanical pulling devices
9. It is a good practice to install two (2) locator wires with plastic pipe through the protective sleeve.
10. Only individuals qualified in the operation of the equipment shall use such equipment. Refer to manufacturer's operation manual.
11. The aiming, alignment and leveling of the equipment is very important in assuring an accurate bore shot.
12. During the bore operation, some method should be used to allow the leading

end of the bore equipment to be located by measurements, or instrumentation.

13. For push-pull type equipment, special care should be taken if an expander is used to enlarge a borehole. The expander can damage other utilities, when pulled back through due to the larger size.

B. Safety

1. Prior to making any underground boring, tunneling, or piercing operation the work area shall be marked for other utilities that may be in conflict with the path of proposed boring operation. These crossings shall be potholed to expose the facilities in question to ensure no contact or damage is inflicted by boring equipment. Potholes or sight holes shall remain open during the entire boring process to ensure that no damage is caused and that backfill is adequate.
2. All hydraulic supply hoses and fittings shall be inspected periodically while in use to guard against failure.
3. Boring equipment shall be maintained and lubricated per manufacturers operator's manual.
4. Entry and receiving excavations shall comply with the requirements set forth in the excavation safety section of this manual. (Section CS B-7)
5. Crew members shall avoid entering the receiving excavation while the boring equipment is in operation if in the judgment of the crew leader the force of the equipment may subject the excavation to excessive vibration.
6. Upon completion of the bore, the equipment shall be examined prior to being handled to ensure that it has not been subjected to voltage by contacting underground electric cables. Personnel shall check for voltage by using a voltage meter before handling boring equipment after the bore.
7. Due to the weight of hydraulic boring equipment, care should be taken to avoid personal injury during handling.
8. Appropriate verbal and hand signals shall be established prior to starting the boring operation should the need for emergency shutdown arise. To avoid confusion, only one person should give signals.
9. Proper personal protective equipment shall be utilized anytime boring equipment is in operation.
10. Avoid placing tools and supply lines across traffic areas to help reduce tripping hazards.

PROCEDURES
METHODS OF INSTALLATION

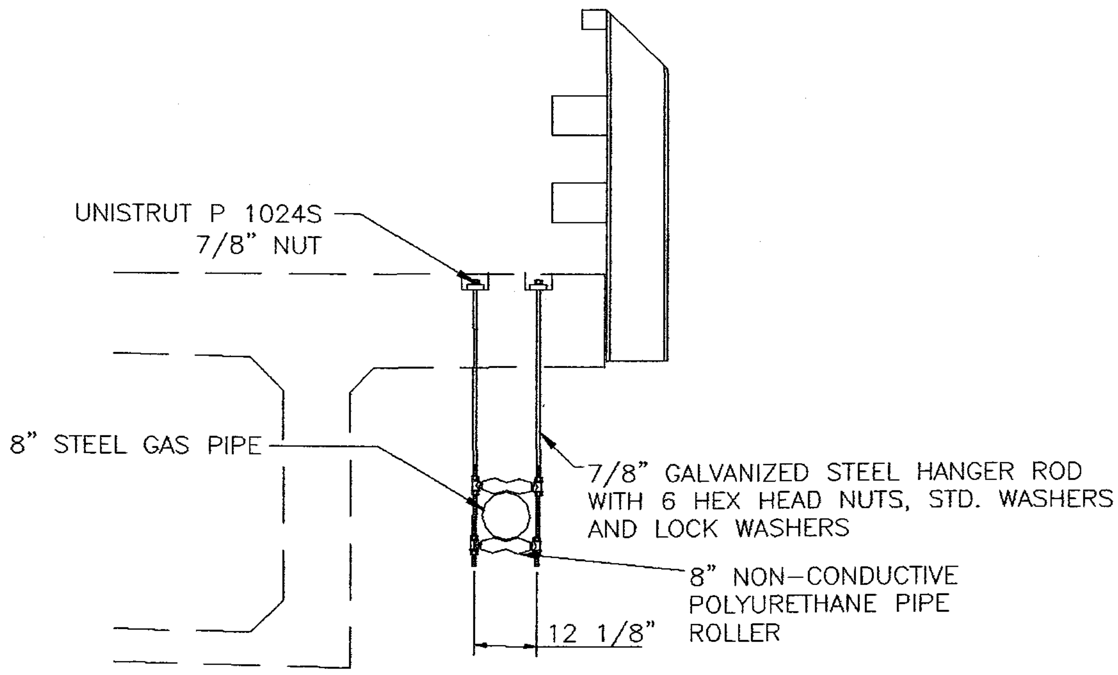
3.5 SUSPENDED

A. There are occasions when it is necessary to suspend gas facilities from existing or newly constructed above ground facilities to facilitate the best possible installation.

B. Steel facilities may be permanently suspended in an above ground location. Approved for above ground UV protective coating shall be applied

C. Plastic facilities may be temporarily suspended in an above ground location for a maximum of 2 years not to exceed 24 months. Precautions shall be taken to protect the plastic pipe for damages caused be outside forces.

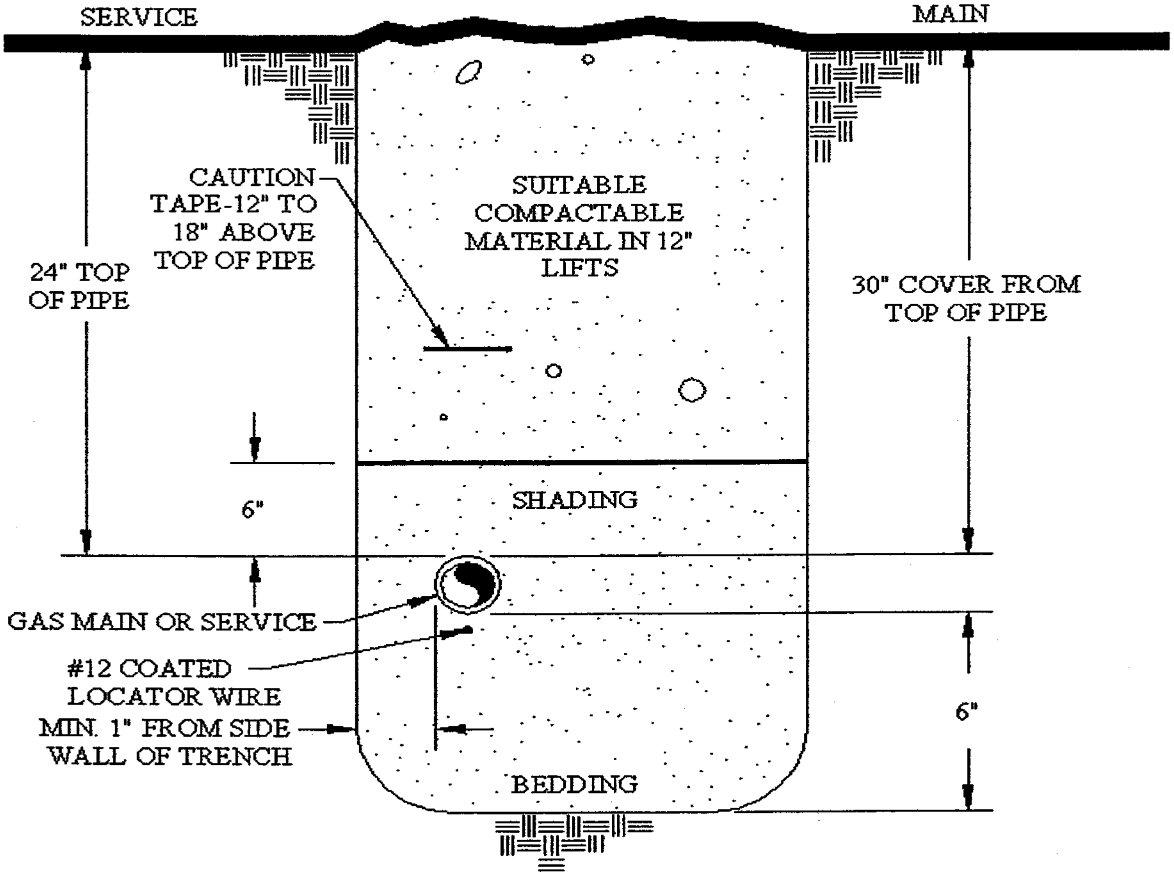
PIPE HANGER DETAIL



PROCEDURES
METHODS OF INSTALLATION

FIGURE #1

(TYPICAL) GAS ONLY



NOTE:

a. Normal cover for gas main-30". Normal cover service 24".

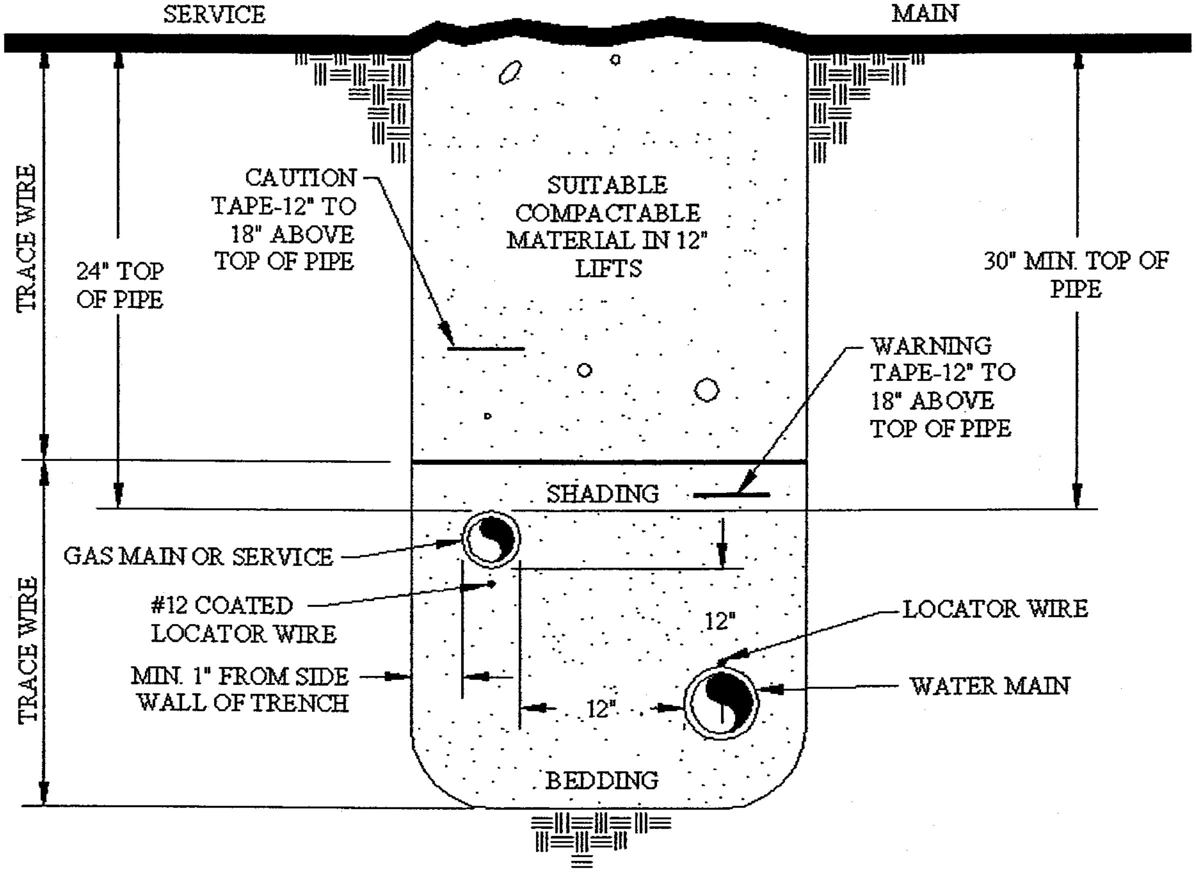
b. Minimum cover from top of fitting-24"

c. Minimum clearance of 12" between gas main and nearest utility.

d. All compaction will comply with the governing agency involved.

PROCEDURES
METHODS OF INSTALLATION

FIGURE #2
(TYPICAL) GAS & WATER



NOTE:

a. Normal cover for gas main-30". Normal cover service 24".

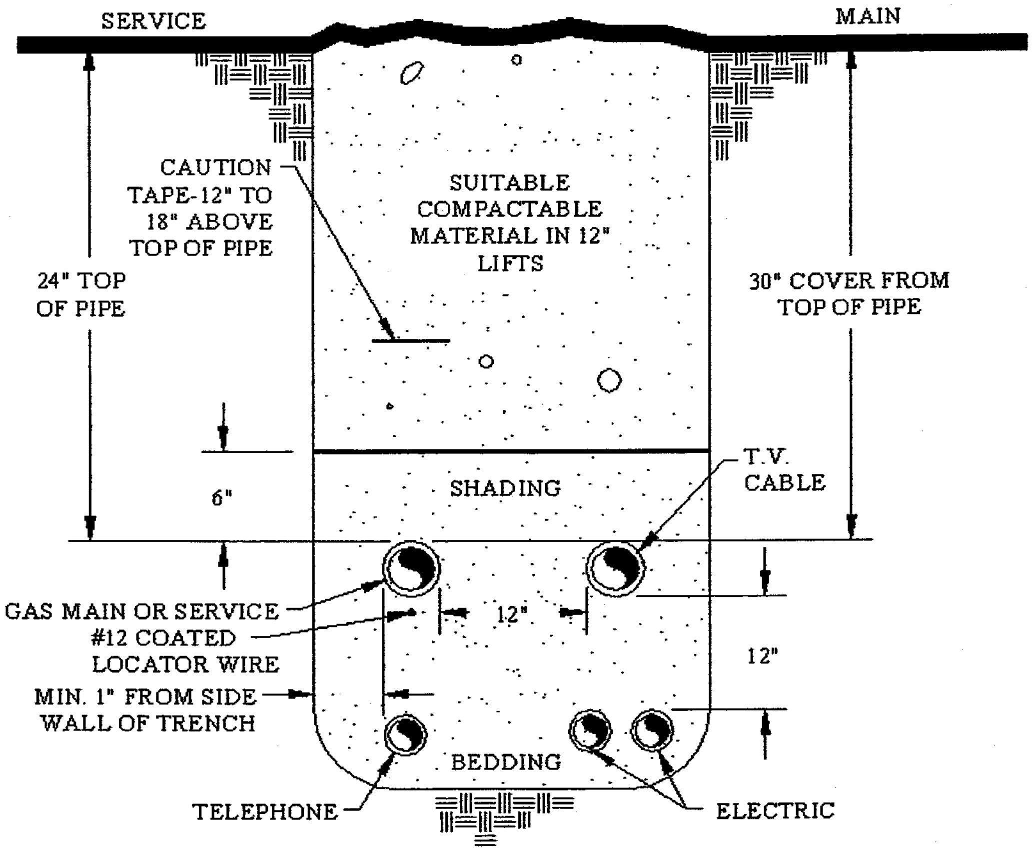
b. Minimum cover from top of fitting-24"

c. Minimum clearance of 12" between gas main and nearest utility.

d. All compaction will comply with the governing agency involved.

PROCEDURES
METHODS OF INSTALLATION

FIGURE #3
(TYPICAL) GAS, ELECTRIC, TEL. & T.V.



NOTE:

a. Normal cover for gas main-30". Normal cover service 24".
b. Minimum cover from top of fitting-24"
c. Minimum clearance of 12" between gas main and nearest utility.
d. All compaction will comply with the governing agency involved.
e. Electric must be below or to the side of gas pipe.

PROCEDURES
LOCATOR WIRE

4.0 PURPOSE

Locator wire (also referred to as tracer wire) shall be installed with all PE or other non-metallic pipe for accurate locating of the natural gas facilities as required by law.

NOTE: It is a paramount importance that all broken or damaged locator wires be spliced or replaced.

4.1 SCOPE

A. Wire

B. Connectors

C. Connection to Steel Main

4.2 WIRE

A. Locator wire shall be resistant to corrosion damage.

B Wire shall be a minimum #14, solid copper (Type TW). Other approved locator wires include the following:
1. #12 solid copper coated
2. Copper clad steel wire with 30 mil high density PE jacketing

C. Wire shall be installed directly below or above the pipe when and where possible.

D. Wire shall be installed as to allow only minimum contact with the pipe, **NOT** spiral wrapped around the pipe

E. Wire may be taped to the pipe at intervals sufficient to maintain a close proximity to the pipe for locating purposed and when inserting the pipe.

F. Wire shall be installed with sufficient slack as to not for snaking of the pipe and to allow for expansion and contraction, and shall be brought up to the top of valve boxes and up risers.

G. Locator wire shall be wrapped twice around the service riser and twisted, below the lock wing cock to allow for locating direct to the wire.

H. **Do Not** allow the wire to make direct contact to the metal riser creating a short.

4.3 WIRE CONNECTORS

A. There are a number of approved methods for connecting multiple locator wire(s) including but not limited to the following list:
1. 3M Wire Connector
2. Split Bolt
3. Crimp Sleeve
4. Wire Nut
5. Direct Bury Lug

B. Wire connector should incorporate self waterproof, corrosion proof seal.

C. All connections shall be sealed

4.4 DEAD END / BRANCH STUBS

Where it may become difficult to accurately locate stubs and dead ends you may:
1. Place a stub marker where practical
2. Attach a one pound, 1#, anode to the locator wire Bury the anode at the dead end providing mass to draw the locator signal

4.5 CONNECTION TO STEEL MAIN

Installations where a plastic service line is tied on to steel mainline piping, for locating purposes, the service locator wire may be attached to the steel by using either the brazing or thermit weld process. This should be first approved by your corrosion department before attaching the wire. **Refer to Section L-3.**

4.6 CONNECTION TO ISOLATED STEEL SECTION

There are instances where a short section of PE pipe is utilized for repair / replacement of an existing cathodiclly protected steel pipeline.

1 Locator wire may be required to continue adequate cathodic protection across the replacement pipe
2 Insure that locator wire is sized appropriately **(Reference Section L C.P.)**

PROCEDURES
EXCAVATION / BACKFILL / COMPACTION

5.0 PURPOSE

The requirements for backfill and compaction pertain to new construction and repairs and are applicable any time the pipeline is uncovered and the back fill is replaced

5.1 SCOPE

A. Excavation
B. Protection against shear loads
C. Padding & Shading
D. Backfill Material
E. Compaction
F. Trench Breaks

5.2 EXCAVATION

A. The operator/contractor shall be responsible to mark planned excavation area and call the appropriate **One-Call System**. Appropriate time shall be allowed for applicable locates to take place before any excavation begins.

B. Dust control shall be maintained throughout the job by watering and clean up of materials causing the dust.

C. Noise control is the responsibility of the company/contractor performing the work. All work equipment shall have appropriate noise muffling devices. Local noise ordinances must be followed throughout the job.

D. The Company/contractor shall limit normal hours of operation between the hours of 7:00 AM and 7:00 PM unless emergency conditions warrant outherwise.

E. The company/contractor shall remove all foreign water entering the trench. **Refer to Section E-10**

G. All excavations shall be clearly marked with barricades / cones / caution tape to protect the general public and keep unauthorized individuals from entering work site. **See Also Section B-5, Traffic Safety**

5.3 PROTECTION AGAINST SHEAR AND BENDING LOADS

A. Protective measures such as protective sleeves and properly placed, compacted backfill are necessary at a connection where an underground polyethylene branch or service pipe is joined to a branch fitting such as a service saddle, branch saddle or tapping tee on a main pipe.

B. Protective measures are necessary for all types of plastic and non-plastic branch connections including heat fusion, mechanical, and electrofusion types.

C. A protective sleeve and properly placed, compacted backfill are generally used together, but whether or not a protective sleeve is installed, the area surrounding the connection must be embedded in properly placed, compacted backfill to protect the polyethylene pipe against shear and bending loads.

5.4 PADDING AND SHADING

A. When protection from the back-fill material and operation is required, the pipe must be padded a minimum of 6" under and shaded a minimum of 6" over the pipe.

B. Shading and bedding shall be a sandy/silty material smooth, free of rocks, and must be able to sift through a ½" screen. In certain conditions additional shading may be required.

NOTE: **Manufactured material, such as crushed rock, should not be used due to sharp edges. If only manufactured material is available, close inspection is necessary.**

5.5 BACK-FILL MATERIAL

The back-fill material and its compaction shall meet the requirements of the political subdivision under whose jurisdiction the work is to be done.

A. In general, back-fill material shall be of the same material as that removed from the excavation except:
   1. Where no-shrink material, or other imported material is required by the governing authority
   2. Where material is of such a nature as to be harmful to the pipe. Avoid rocks larger than 3" in diameter back-filled in the first lift above the shading material

3. Where wet conditions have rendered the back-fill material too soft for adequate support.

5.6 COMPACTION

A. Excavations shall be compacted as required by the local political subdivision or the Operator's standard as may apply
1. Adequate support for the pipe must be provided during the back-fill process to avoid damage to pipe caused by torsion forces.
2 Pay particular attention to material providing adequate support under tees, particularly service / tap tees.
3 No lift shall be greater than 12".
4 Where slurry cement backfill is necessary it shall consist of a fluid, workable mixture of commercial quality concrete sand, cement and water. Not less than 94 pounds of cement shall be used for each cubic yard of material product
5 An appropriate aggregate base equal to any removed shall be place back at the top of the trench in preparation for asphalt or as required by the political subdivision.

B. The purpose on compaction is to prevent trench failure i.e. sinking, washout, etc..

C. Acceptable methods of achieving compaction are:
1. Wheel roll (non-paved and non-travel areas only)
2. Mechanical and air tampers
3. Water jetting

D. Outside laboratory testing should be utilized when practical
1. Nuclear Tester
2. Dynamic Cone Penetrometer

5.7 TRENCH BREAKS

Where uphill trenches may be subject to heavy water run-off it may be necessary to install trench breaks to prevent loss of backfill material which may subject the gas pipe to potential damage.

A. Slope grade exceeding 20%
1. Trench breaks shall be placed at intervals of 100 linear feet in separation

PROCEDURES
EXCAVATION / BACKFILL / COMPACTION

2. Trench breaks may consist of sand bags, clay bags, and / or other material sufficient to slow potential erosion of the trench backfill materials
3. Trench breaks shall be carefully placed under and around the gas pipe as not to damage the pipe
4. Over excavation of the trench bottom and side walls at the placement location will assist in holding the trench breaks in place.

PROCEDURES
CASING AND SLEEVING

6.0 PURPOSE

It is the purpose of this section to provide minimum requirements and information on the installation of pipe casing and sleeving.

When installing sleeving or casing in an open trench, caution tape shall be placed 6" to 12" above the sleeve or casing. **Refer to Section E-8**

6.1 SCOPE

A. Sleeve Installation
B. Casing Installation
C. Documentation

6.2 SLEEVING

Sleeving is normally installed through a bored hole; however, in some instances, permission may be obtained to open cut for the installation. When the open cut method is used, the soil beneath and around the sides of the lower one-half of the sleeving shall be properly compacted. If the native soil is not suitable for compaction, sand, or other suitable compatible material shall be used.

A. For bores, when the native material does not meet the shading/padding requirements. **Refer to Section E-5**

B. To protect the gas carrier piping when minimum clearances from substructures cannot be maintained

C. When minimum cover can not be obtained.

D. To facilitate future replacement of gas facilities, such as street or ROW crossings.

Each sleeve shall comply with permitting and regulatory requirements.

E. The following requirements should be followed when using sleeving:

1. Sleeving material shall be **yellow,** PE, schedule 40 PVC, or steel pipe

NOTE: Schedule 40 PVC may be used for sleeving. At no time should this material to be used for gas carrier piping.

2. Shading material is not required where sleeving is utilized. Care must be used to avoid damaging the sleeving during installation and backfill operations.

3. When sleeving terminates at or near a building, the end nearest the building shall be sealed to avoid possible migration of escaping gas. End seals may also be used to minimize backfill materials from entering the sleeving.

   - Remove any burrs or sharp edges from end of sleeve/casing.
   - Slide end seal onto sleeve/casing before installation of carrier pipe.
   - Install appropriate bushing into end of sleeve/casing. Electrical tape can be used to hold bushing in place.
   - Insert carrier pipe (with tracer wire where applicable). Install sealant strip by sandwiching tracer wire between two layers of sealant. Over wrap with one layer of electrical tape.
   - Hold cold shrink seal and pipe in proper position and unwind core counter clockwise.

4. The PVC sleeving should be joined using cement. Care must be used to minimize the amount of cement used on the socket, as any excess will puddle inside the sleeving. Allow adequate time for cement to dry to avoid wet cement from contacting the PE pipe.

6.3 CASING

A. Welding

All welds in casing pipe shall be complete, full-penetration welds, properly aligned and made by a qualified welder. Any offset in casing pipe shall be held to 1/16" or less in the bottom quadrant. Casing pipe shall be installed so that alignment and slope are uniform throughout the entire length.

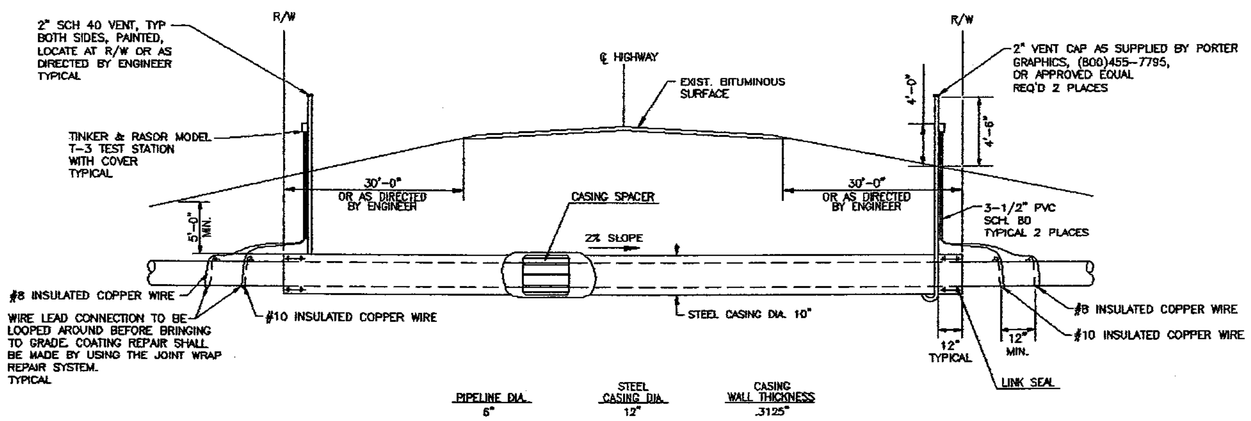
PROCEDURES
CASING AND SLEEVING

B. Vent Pipes

1. All steel casings shall include vent pipes.

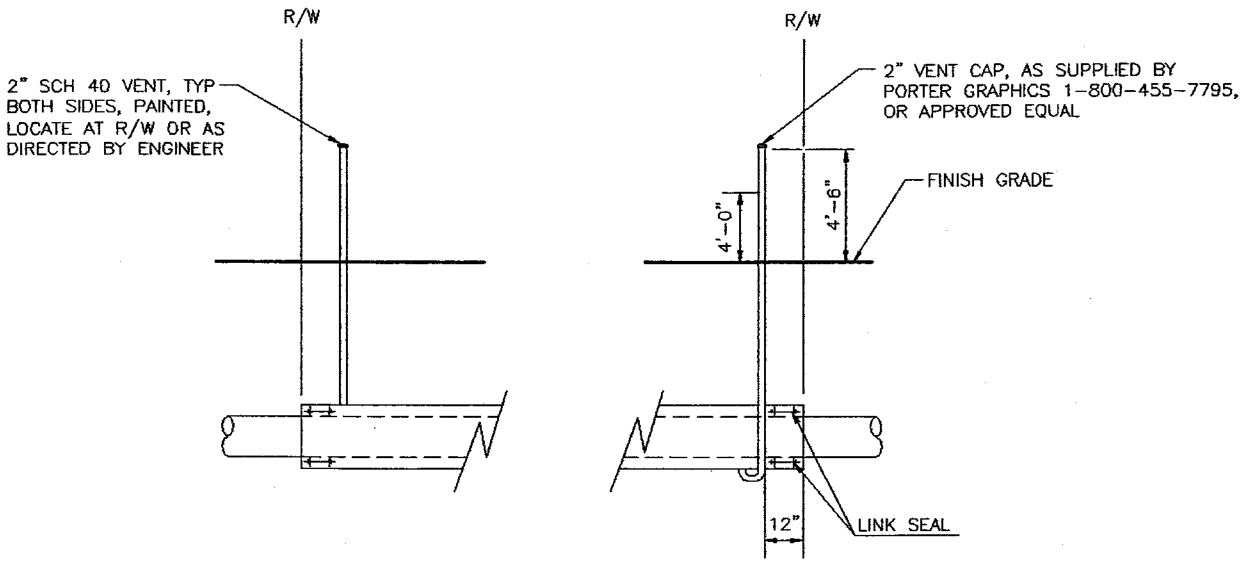
2. Vents shall be installed 3 ft aboveground with an approved vent cap adequate to prevent rain or other foreign material from entering the vent and causing a blockage.

DETAIL – CASING UNDER HIGHWAY (STEEL NATURAL GAS PIPE)

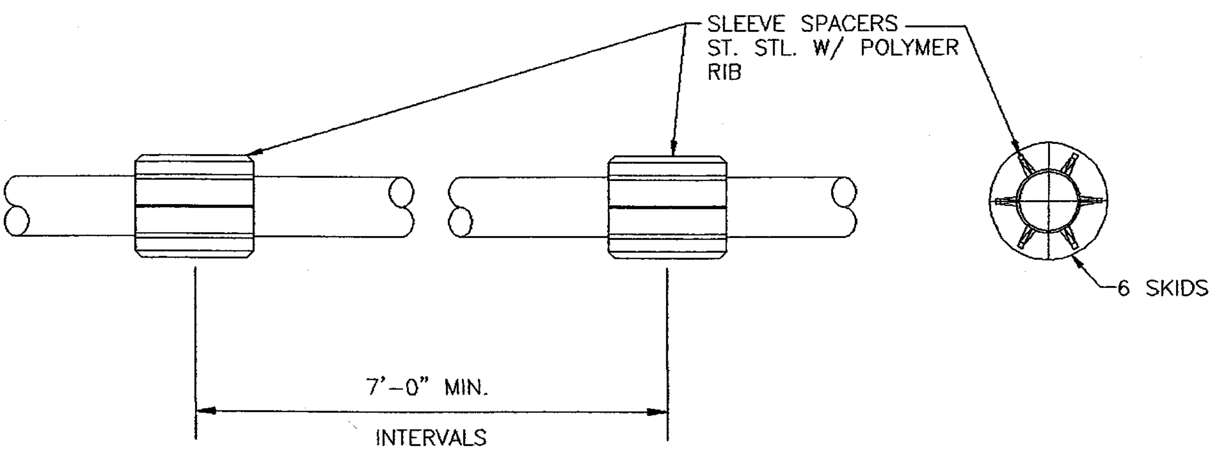


PROCEDURES
CASING AND SLEEVING

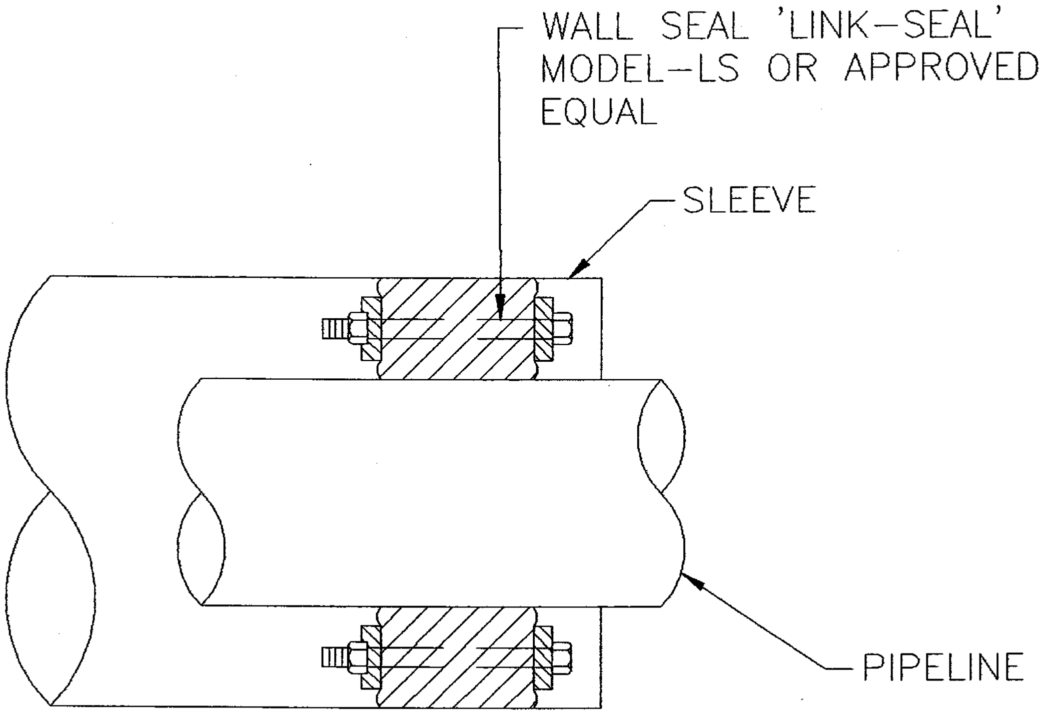
DETAIL–VENT



DETAIL–CASING SPACER



DETAIL-LINK SEAL



6.4 DOCUMENTATION

When casing or sleeving is used, the location, size, and type of casing or sleeving shall be clearly documented on the appropriate forms.

PROCEDURES
ABANDONMENT AND REINSTATEMENT

7.0 PURPOSE (192.725 & 192.727)

This section describes the methods to be used for abandonment and reinstatement of pipeline facilities.

7.1 SCOPE

A. Abandon
B. Reinstate

7.1 ABANDONMENT

Each Operator facility or pipeline that is abandoned or inactivated within its operating area must be abandoned or inactivated in accordance with a plan which shall include the following:

A. Each facility abandoned in place and lines not subject to gas pressure, except when undergoing maintenance, must be disconnected from all sources and supplies of gas, purged of gas, and the ends sealed.

B. If air is used for purging, the operator shall ensure that a combustible mixture is not present after purging.

C. A gas service should be abandoned when it is no longer used or useful for carrying gas or when inactive for 36 months. Part of all of a service line may be abandoned, depending on the circumstances.

D. Services to be abandoned will normally be cut at the source of supply when any of the following conditions exist:

1. The main is not under pavement.
2. The condition of the pipe indicates that a stub would not remain leak free for the life of the main.

E. In all other cases, services should be abandoned adjacent to the curb or property line.

F. Verify 0% gas with CGI. **Refer to Section H-5.**

G. All open ends of abandoned main and service piping shall be securely sealed.

H. Service riser shall be removed.

7.2 REINSTATING ABANDONED FACILITIES

Abandoned facilities may be reinstated under the following conditions:

A. Facility must be polyethylene pipe or protected wrapped steel pipe.

B. Facility must have existing locator wire or be able to be accurately located by documentation.

C. Facility must pass a pressure stand-up test. **Refer to Section H-3**

D. Purge facility. **Refer to Section H-5**

PROCEDURES
CAUTION TAPE

8.0 PURPOSE

The purpose of this section is to establish the minimum requirements for the installation of caution tape with all gas newly installed or replacement gas mains and services.

8.1 SCOPE

A. Installation of caution tape

8.2 CAUTION TAPE

Caution tape shall be:

A. Installed 6" to 12" directly above the pipe

B. Yellow in color

C. Caution tape shall state **CAUTION - BURIED GAS PIPELINE.**

D. Installer shall take precautions to insure that the caution tape is protected and remains above the gas piping during the backfill process.

E. When installing main or service in sleeve or casing in an open trench, place the caution tape 6" to 12" above the sleeve or casing.

PROCEDURES
PIPE BENDING

9.0 PURPOSE (192.313 192.315)

Bending is an acceptable method to accomplish a change of direction during the installation of steel and plastic pipe.

9.1 SCOPE

A. Plastic Pipe
B. Steel Pipe

9.2 PLASTIC PIPE:

A. Plastic pipe may not be installed with a bend radius of less that 20 time the diameter of the pipe.

B. No fittings may be installed within the bend area.

C. The bend area refers to the change in direction of the main other than the normal snaking of the pipe in the trench.

D. Turns of 90 degrees or greater shall be accomplished by means of installing a manufactured elbow.

9.3 STEEL PIPE:

A. Wrought steel elbows shall be used where bends are required to construct the pipeline on the alignment shown on the plans and when bending of the steel pipe is not practical or allowed.

Elbows may be trimmed to create the exact deflection angle. Wrought steel welding elbows and trimmed segments of these elbows may not be used for changes in direction unless the arc length measured along the crotch is at least 1 inch. Elbows shall be trimmed if necessary to taper the wall thickness to match the pipeline wall at welds.

B. Mechanical bending of the steel pipe shall be allowed when done in compliance with the following requirements:
1. A bend must not impair the serviceability of the pipe.
2. Each bend must have a smooth contour and be free from buckling, cracks, or

any other mechanical damage.

3. Wrinkle bends are not permitted
4. The longitudinal weld on the pipe must be near as possible to the neutral axis of the bend (straight up or down) unless: the bend is made with an internal bending mandrel; or the pipe is 12 inches or less in outside diameter or has a diameter to wall thickness ratio of less than 0.70.
5. Each circumferential weld of steel pipe which is located where the stress during bending causes a permanent deformation in the pipe must be non-destructively tested either before or after the bending process.
6. The bend shall not exceed the maximum bending radius for the particular pipe in use. The maximum bending radii for the pipe shall be specified by the engineer or as shown on the plans.
7. Sagging may be used to make vertical adjustments in the pipe to accommodate crossings of other structures. Minimum sag distances shall be calculated using the following formula:

$$L = 227 * (H*D)^{0.5}$$

L = the minimum length to achieve by the bend in feet,
H = the difference in elevation achieved by the bend in feet, and
D = the outside diameter of the pipe in inches.

Sags must begin and end a minimum of this distance from the structure to be crossed.

PROCEDURES
BEST MANAGEMENT PRACTICES (BMPs)

10.0 PURPOSE

The purpose of this section is to establish the minimum requirements for Best management Practices (BMPs) to be exercised during to construction, operations and maintenance of the gas system so as to protect environmental quality

10.1 SCOPE

A. Every effort shall be taken to protect environment quality in and around gas installation and repair work. This may include but not be limited to the use of weed free straw bails, filter fabric fencing, and / or other methods for:
   1. Erosion control
   2. Inlet protection
   3. Slope stabilization
   4. Mulching

B. Construction plans shall include full restoration of disturbed surfaces to pre-construction conditions.

10.2 EROSION CONTROL

A. Prevention and Control of Pollution from Toxic Materials
   1. Dispose of wastes in accordance with Federal, State and Local regulations.
   2. Do not apply asphalt sealer, emulsified asphalt, or solvents before precipitation events (rain or snow).
   3. Do not leave tools or equipment in the dirt, street, gutter, storm drain or stream.

B Erosion and Sediment Control Practices
   1. General Practices
      - Clearing and grading to be only as far in advance of work as reasonably required.
      - Wherever possible, plants and trees need to be protected and preserved.
      - Construction of BMPs (silt fences, etc.) should be placed in advance of disturbance.
      - Re-grading, reclamation and reseeding should follow as closely as possible after completion of pipeline construction and testing activity.
      - BMP removal only after completion of reclamation.

2. Housekeeping:
   - Keep adjacent roadway and sidewalks free of dirt, mud or other materials subject to tracking by vehicles of foot traffic.
   - Sweep, shovel or otherwise clear dirt, mud or other materials subject to mobilization by rainfall as needed in anticipation of predicted or observed approaching precipitation events.
   - Sweep, shovel or otherwise clear dirt, mud or other materials subject to mobilization by rainfall at the close of construction each day.
3. Training:
   - Employees shall be trained in the purpose, construction and maintenance of BMPs.
   - Employees shall be familiar with BMPs and be to be alert to conditions that may result in uncontrolled runoff.
   - Supervisory personnel shall be trained to inspect all storm water runoff controls each day, including both general practices and BMPs.

10.3 <u>SOIL STABILIZATION PRACTICES</u>

A. General Revegetation Requirements
1. Obtain the written recommendations of the local soil conservation authorities regarding the need for and the amount of fertilizer and soil pH modifying agents.
2. These materials are to be applied in accordance with the written recommendations obtained.
3. If manure is applied, the nitrogen application shall be reduced by half for each 10 tons/acre of manure applied.
4. Where possible, incorporated soil pH modifying agents and fertilizer into the top 2 inches of soil.
5. Prepare a firm seedbed in disturbed areas to a depth of 3 to 4 inches using appropriate equipment. If hydroseeding is to be done, scarify the seedbed to facilitate lodging and germination of the seed.
6. The project area should be seeded in accordance with written recommendations on seeding mixes, rates and dates obtained from the local soil conservation authority. Alternative seed mixes specifically requested by the landowner or land-managing agency may be used. Any soil disturbance that occurs outside of the recommended vegetation shall be treated as a winter construction problem and mulched as described

later. Except in lawns, all seeding of permanent cover should be done within the recommended seeding dates. If seeding cannot be done within those dates, temporary erosion control measures shall be done at the beginning of the next recommended seeding season.

7. Seed slopes steeper than 33 percent immediately after final grading, weather permitting, subject to the limitations addressed above in the General Requirements section.
8. Seed rights-of-way within 10 working days of final grading, weather and soil conditions permitting, subject to the limitations addressed in the limitations addressed above in the General Requirements section.
9. Develop specific procedures in coordination with the appropriate agency to prevent the introduction or spread of noxious weeds and soil pests resulting from construction and restoration activities.

B. Temporary Erosion Control Measures

1. In the event that final cleanup is deferred more than 10 days after the trench is backfilled, all slopes adjacent to wetlands and waterbodies shall be mulched with 2 tons/acre of hay or straw, or its equivalent, for a minimum of 100 feet on each side of the wetland or waterbody. Mulch other areas as described in the section on mulching.
2. All Best Management Practices (BMPs) shall be installed and maintained.

C. Seed Specifications

1. Purchase seed in accordance with the pure live seed (PLS) specifications for seed mixes.
2. Seed should be used within 12 months of acquisition
3. Treat legume seed with an inoculant specific to the species. For conventional seeding, use 4 times the manufacturer's recommended rate of inoculant, and 10 times the recommended rate if hydroseeding methods are being used.
4. Uniformly apply and cover seed in accordance with the written recommendations of the local soil conservation authorities. A seed drill equipped with a cultipacker is preferred for application, but broadcast or hydroseeding can be used at double the recommended seeding rates. Where broadcast seeding is used, firm the seedbed with a cultipacker or roller after seeding.

D. Mulch Specifications

1. Mulch all dry sandy sites and all slopes greater than 8 percent with 2 tons/acre of straw or hay or its equivalent. Clearing slash and other native

materials including rock may be used.

2. Spread mulch uniformly over the area so that at least 75 percent of the ground surface is covered.
3. Anchor loose mulch immediately after placing to minimize loss by wind and water. Use a mulch-anchoring tool to crimp the mulch to a depth of 2 to 3 inches. A regular farm disc should not be used.
4. Mulch may also be anchored using a liquid mulch binder, except within 100 feet of wetlands or water bodies. Synthetic binders should be used at rates recommended by the manufacturer. Use caution in residential areas or areas of pedestrian traffic, because asphaltic and some synthetic binders can damage shoes, clothing and automobile paint.
5. Use jute thatching or bonded fiber blankets (instead of straw or hay) on banks of water-bodies to stabilize seeded areas. Anchor the thatching with pegs or staples.

10.4 CONTROLLING RUNOFF

A. Silt Fences
   1. Silt fences are particularly well suited to linear construction projects because they too are linear construction.
   2. Silt fences should be constructed according to specifications set forth in the Erosion and Sediment Control Field Manual published by the California Regional Water Quality Control Board-San Francisco Bay Region, or equivalent. See drawing titled “Erosion and Sediment Transport Best Management Practices.”

B. Straw Bail Dike
   1. Straw bail dikes can be good temporary barriers.
   2. Straw bail dikes should be constructed according to specifications set forth in the Erosion and Sediment Control Field Manual published by the California Regional Water Quality Control Board-San Francisco Bay Region, or equivalent. See drawing titled “Erosion and Sediment Transport Best Management Practices.”

C. Storm Drain Inlet Protection
   1. Elevated barriers can be temporarily installed around storm drains to prevent silt-laden water from discharging directly. The elevated drain protection allows silt to settle before water entering the drain. The construction

contractor can retrieve and manage the collected silt in a suitable manner following the storm event. See drawing titled "Erosion and Sediment Transport Best Management Practices."

D. Pre-construction Control Practices

1. The predominant pre-construction control is street paving with curbs, gutters and a storm-water collection and control system. Collected storm water flows to nearby creeks and channels and rivers.
2. Local waterways generally follow well-established creek beds. These streams cross roads in concrete boxes and galvanized steel culverts.
3. A field survey should be conducted in advance of construction to identify areas where stream run-on might affect construction storm water control.
4. Pipeline construction BMPs will minimize run-on from road and roadside surfaces. BMPs will also minimize flow of sediment-laden waters into the storm water system.
5. Some areas have no curb, gutters or other controls. These areas may require special attention and additional control measures to prevent run-on.

10.5 DUST CONTROL

A. Air quality may be impacted during construction by emissions from construction equipment and from fugitive dust from earth moving or stockpiling. Neither is normally significant. Both are temporary.

B Using modern equipment in good repair can best minimize emissions from construction equipment.

C. Maintaining existing vegetation, mulching, and revegetation will minimize fugitive dust in the long term. (See "Erosion and Sediment Control Practices")

D. Good housekeeping during construction, i.e., minimizing dirt on traffic surfaces, and proper cleanup will best control fugitive dust in the short term. (See "Erosion and Sediment Control Practices")

E. Other measures, such as applying water to disturbed areas and stockpiles, should be considered if fugitive dust emissions from those sources become a problem in the judgment of the environmental supervisor. These techniques are well established and need not be further described here.

10.6 CONSTRUCTION VEHICLES AND EQUIPMENT

A. Maintenance
1. Maintain all construction equipment to prevent oil or other fluid leaks.
2. Keep vehicles and equipment clean; prevent excessive build-up of oil and grease.
3. Use off-site repair shops.
4. Keep stockpiled spill cleanup materials readily accessible.
5. Regularly inspect on-site vehicles and equipment for leaks, and repair immediately.
6. Check incoming vehicles and equipment (including delivery trucks and employee and subcontractor vehicles) for leaking oil and fluids.
7. Do not allow leaking vehicles or equipment on-site.
8. Segregate and recycle wastes, such as greases, used oil or oil filters, anti-freeze, cleaning solutions, automotive batteries, hydraulic, and transmission fluids.

B. Fueling
1. If fueling must occur on-site, use designated areas away from drainage.
2. Locate on-site fuel storage tanks within a bermed area designed to hold the tank volume. (No on-site fuel storage planned at this time)
3. Cover retention area with an impervious material and install it in a manner to ensure that any spills will be contained in the retention area.
4. Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
5. Use drip pans for any oil or fluid changes.

C. Washing
1. Use as little water as possible to avoid installing erosion and sediment controls for the wash area.
2. If washing must occur on-site, use designated bermed wash areas to prevent wastewater discharge into storm water, creeks, rivers, and other water bodies.
3. Use phosphate-free, biodegradable soaps.
4. Do not permit steam cleaning on any construction site.

PROCEDURES
BEST MANAGEMENT PRACTICES (BMPs)

10.7 HAZARDOUS MATERIALS

A. Some materials used in the construction and maintenance of gas pipeline and pipeline facilities that may be present at the construction site or in construction yards may be detrimental to groundwater. Exposure of these materials to precipitation could result in their mobilization and contribution to storm water pollution.

1. Pipe and pipeline appurtenances containing packaging materials such as grease or other corrosion protective materials
3. Steel pipeline coating material, coating compound, or primer
4. CAD welding materials
5. General construction materials including sand, gravel, cement, asphalt, and others

B Minimization Methods

1. Supervisors will endeavor to minimize quantities of materials stored in on construction sites or site yards.
2. Only the amount of material needed for each day's activities should be stored at the construction site.
3. Likewise, unused materials will be returned to the construction yard after each day's work.
4. Excavation and backfill materials on site shall be protected to prevent discharges during a rain event.
5. Keep chemicals in their original containers and well labeled at all times.
6. Surplus or waste earthen materials will be disposed of at a local landfill.

10.8 NON-STORM WATER MANAGEMENT

A. Dewatering

1. Discharging sediment-laden water form a dewatering site into any water of the state without filtration is strictly prohibited.
2. Water from a dewatering site shall be sent to a "High and Dry Site".
3. Listed below are several approved methods for filtering sediment-laden water that must be removed from construction sites using dewatering pumps:

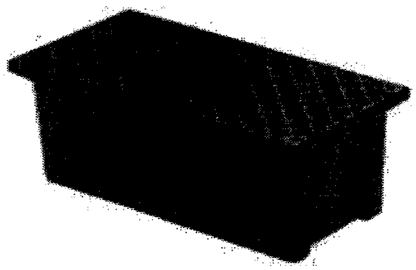
B Hydrostatic Testing

1. All hydrostatic tests shall be conducted such that water is either reused or disposed of in compliance with all applicable rules and regulations.
2. Hydrostatic test water cannot be discharged to waters of the State or tributaries thereto.
3. Drying of the pipeline shall be accomplished by means of pigging. No hazardous materials shall be used for drying purposes.

<u>Filter Box</u>

Simple box with filter media. Provides portable filtering capability for low-flow applications.

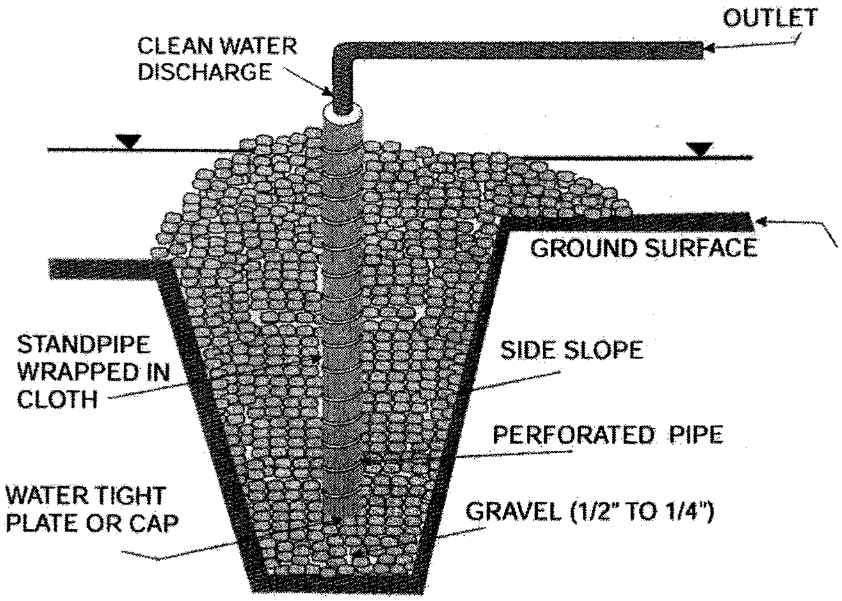
<u>Portable Sediment Tank</u>



Dewatering Pit

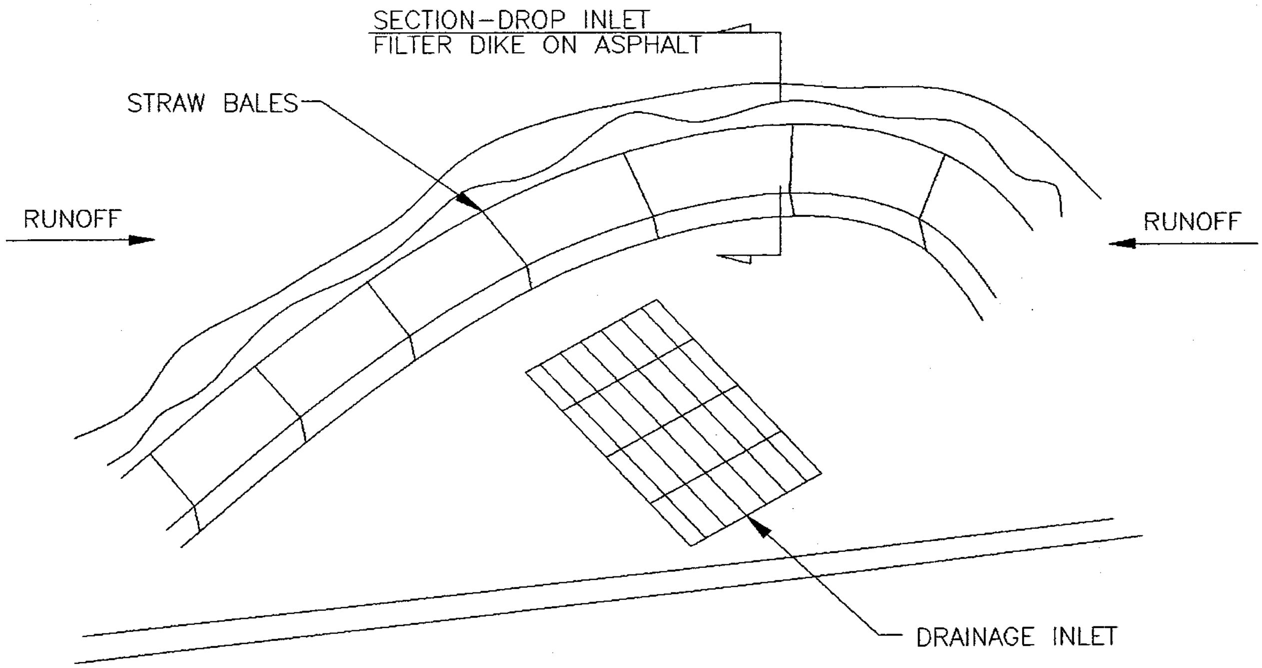
Similar to Filter Box, but larger capacity.

Sediment-laden water flows first into dewatering pit. Clarified water discharges.

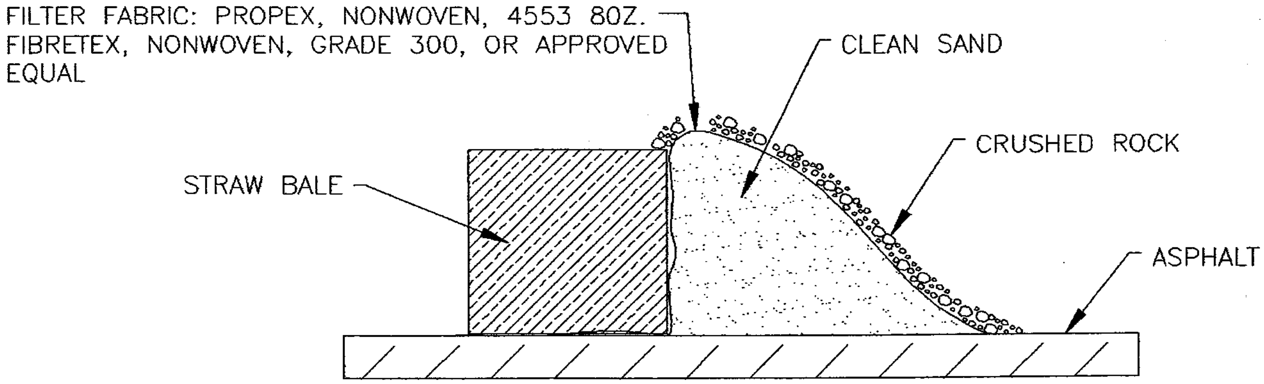


PROCEDURES
BEST MANAGEMENT PRACTICES (BMPs)

DETAIL–DROP INLET FILTER DIKE ON ASPHALT

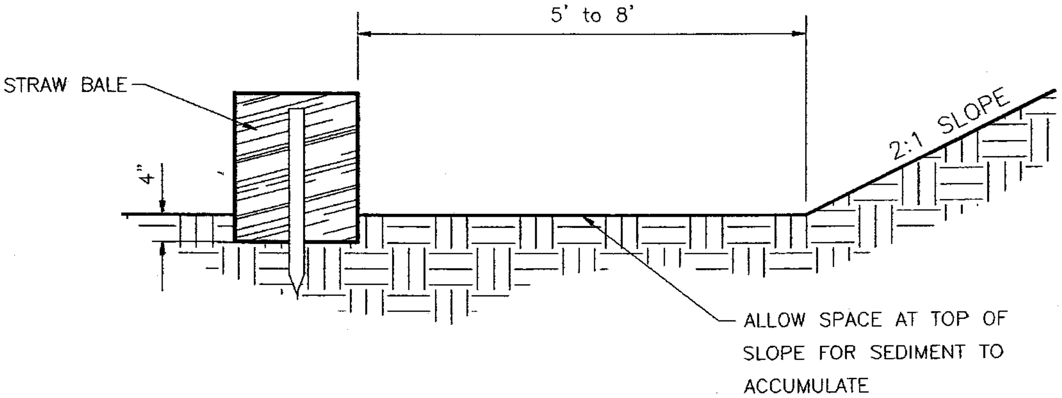


SECTION–DROP INLET FILTER DIKE ON ASPHALT

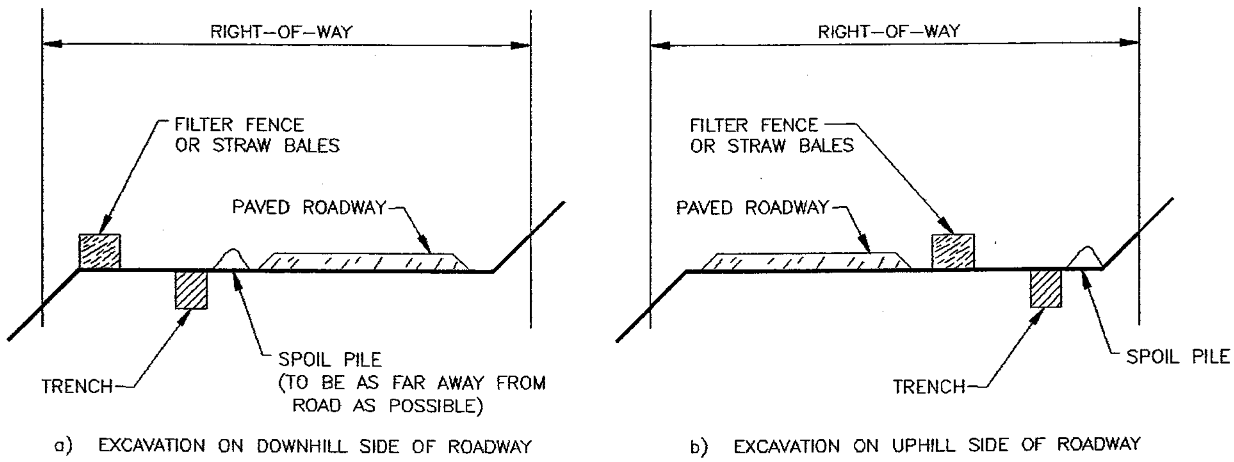


PROCEDURES
BEST MANAGEMENT PRACTICES (BMPs)

DETAIL-STRAW BALE DIKE



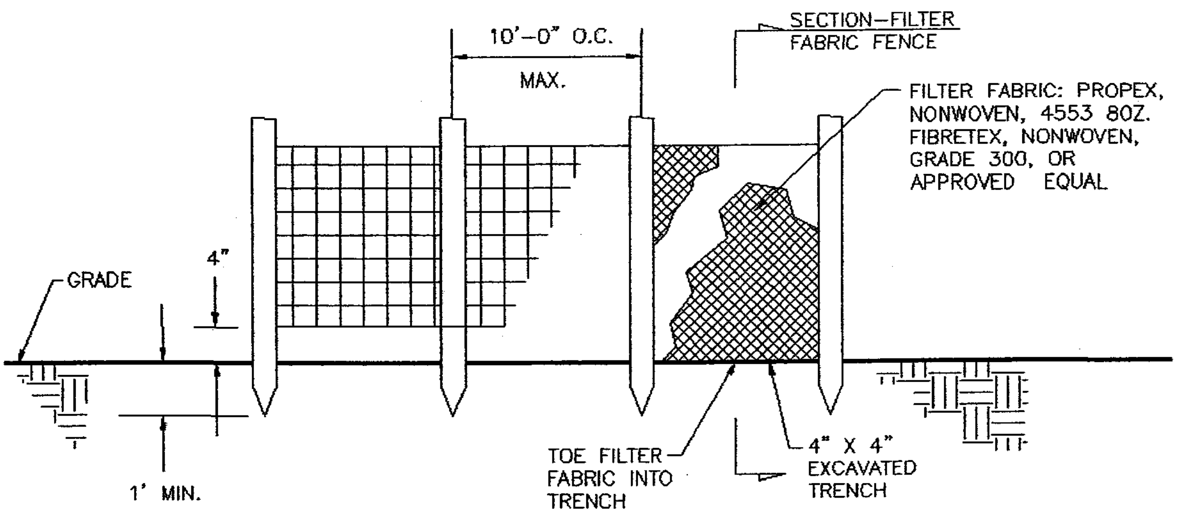
DETAIL-EROSION CONTROL



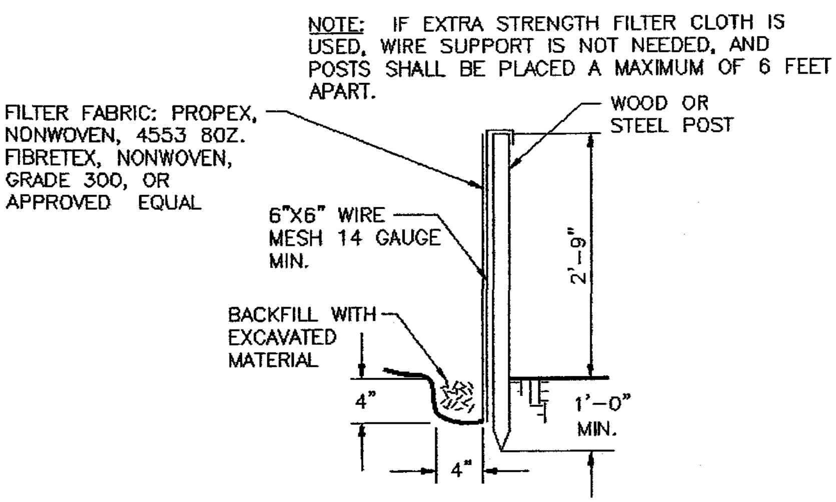
NOTE: FIELD MODIFICATIONS OF THESE INSTALLATIONS MAY BE NECESSARY AS SUGGESTED BY REGULATORY INSPECTORS OR ENGINEER.

PROCEDURES
BEST MANAGEMENT PRACTICES (BMPs)

DETAIL–FILTER FABRIC FENCE



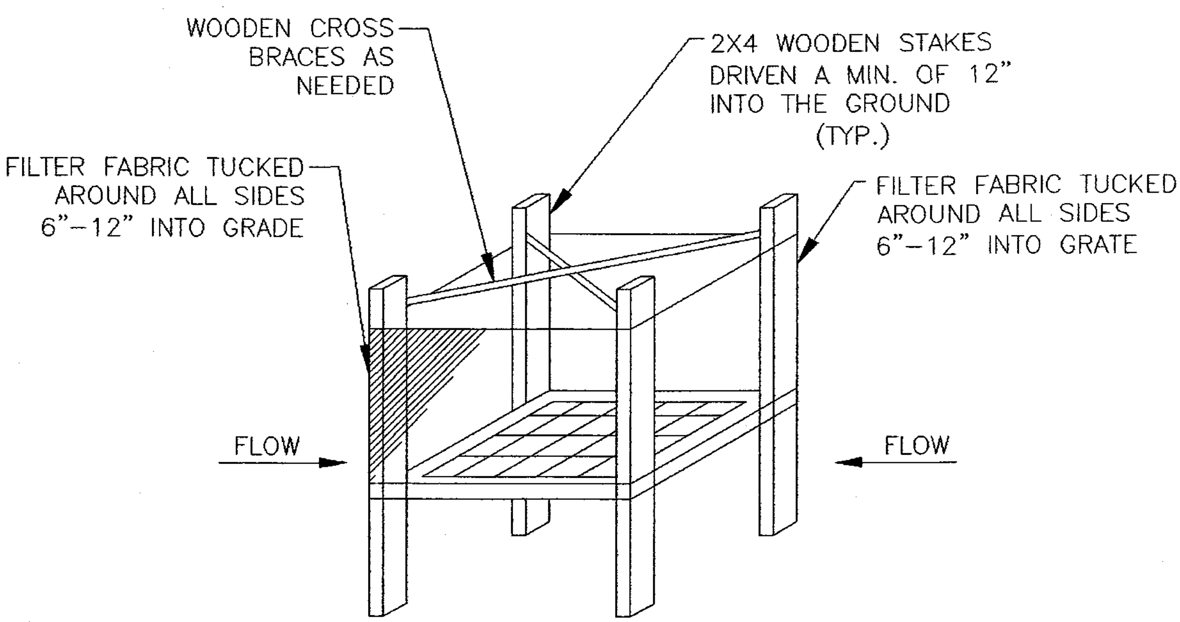
SECTION–FILTER FABRIC FENCE



PROCEDURES

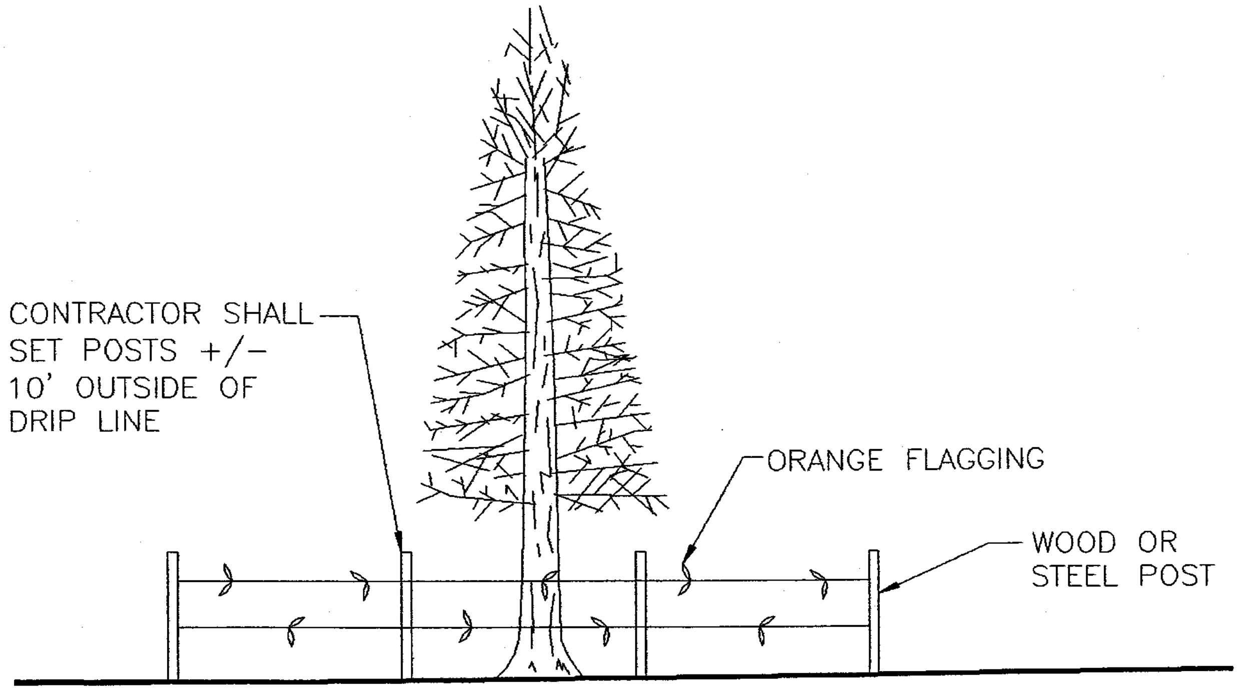
BEST MANAGEMENT PRACTICES (BMPs)

DETAIL–DROP INLET FILTER



PROCEDURES
BEST MANAGEMENT PRACTICES (BMPs)

DETAIL–VEGETATION PROTECTION FENCING



PROCEDURES
METER SET ASSEMBLIES

1.0 PURPOSE:

It is the purpose of this section to provide minimum requirements for meter set assemblies.

1.1 SCOPE:

This section covers the following:

A. Handling of meters

B. Installation/Turn-on/Turn-off

C. Regulator Flow and Lock-up

D. Meter and regulator removal

E. Bypassing of meter set assemblies

F. Appliance De-rating

1.2 GENERAL

A. Meter set assemblies normally conform to standardized designs but may require specialized designs by the Engineer.

B. All meters will have been tested to a minimum of 5 psig.

C. Each meter set assemblies will include an appropriate service regulator.

D. Whenever a technician visits a MSA, he/she shall note any presence of atmospheric conditions observed

E. MSA shall always be level to avoid undue stress on pipe and fittings

PROCEDURES
METER & RISER LOCATIONS

2.0 PURPOSE

This section provides minimum requirements on the approved locations for gas meter set assemblies (MSA).

2.1 SCOPE

A. Location

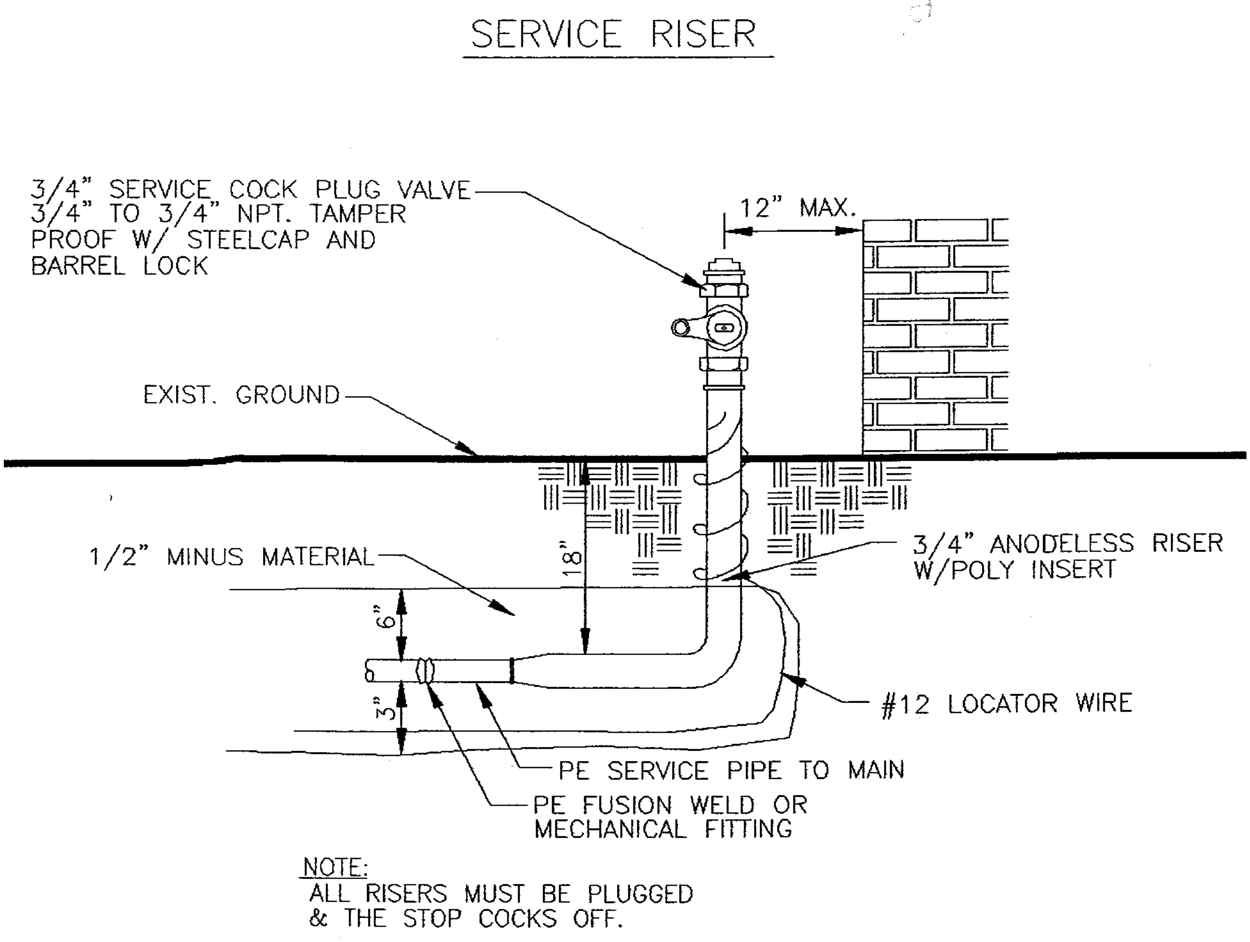
B. Exception

2.2 LOCATION

A. Service risers and MSA shall be located outside in safe locations.
   1. Be outside where readily accessible and in a well ventilated area where gas from the vent can escape freely into the atmosphere and away from any opening into the building.
   2. Be adequately protected from damage.
   3. Include the installation of a readily accessible shutoff valve on the high-pressure, inlet side of the meter, before or downstream of the service regulator.
   4. The regulator vent shall be a minimum of 3' from a source of ignition or from any opening to building. The distance shall be measured from the regulator vent.

B. Service risers and any portion of the MSA when installed shall **not:**
   1. Be in an area where the riser will be subjected to damage, such as adjacent to a driveway, unless protected by an adequate guardrail, etc.
   2. Be under a window.
   3. Be in an area where the riser will be subjected to excessive corrosion or vibration.
   4. Be in an area where the MSA or riser will be under an electric meter and/or electric panels.
   5. Be under a mobile home or fire escape.
   6. Be in unventilated spaces.

PROCEDURES
METER & RISER LOCATIONS



2.3 EXCEPTIONS

Meter may be installed in vaults or other enclosures only when:

1. No aboveground alternative is suitable
2. The MSA is properly protected from damage
3. The service regulator is properly vented to the outside atmosphere, or an internal relief regulator is utilized
4. Steps are implemented to drain excess water

PROCEDURES
METER HANDLING & INSTALLATION

3.0 PURPOSE

This section establishes procedures for the proper handling and installation of gas meters.

3.1 SCOPE

A. Proper handling and care of maters

B. Meter set assembly

3.2 METER HANDLING

A. Care shall be exercised at all times when handling natural gas meters to avoid jarring or damaging the meter.

B. Meters shall remain in their upright position at all times.

C. Care shall be exercised to insure that the proper meter is installed to match the customer gas requirements. Meter shall not undersized nor oversized.

3.3 METER SET INSTALLATION

A. Meter Set Assemblies shall, whenever practical, be installed at the structure limiting the installation of customer owned and maintained houseline or yard line.

B. Property line sets are acceptable only when it is most practical for the customer and the Operator.

C. Meters will not be set for mobile homes unless the connection between the rigid mobile pipe and the gas riser or supply is by an, approved for mobile home use, adequately sized, flexible connector. Connector is not to exceed a maximum of 6' in length.

NOTE: Each mobile home shall have an approved gas shutoff valve down stream of the operator's meter. This valve shall not be located under the mobile home.

D. Newly installed service regulators **will not** be located in confined spaces other than a vault or other enclosure previously approved by the Operator.

E. All service regulators shall be vented to the outside atmosphere unless an approved internal relief regulator is used.

F. If a meter set assembly becomes enclosed, the operator shall require the customer to reimburse the entire cost of relocating the MSA to the closest approved outside location.

D. Regulators shall not be installed in a position that results in the vent opening facing upward.

E. Regulators installed in a position that results in the vent opening facing in a horizontal position shall have a street ell installed in the opening, using pipe thread compound on the threads, and the ell secured in place with the opening facing downward. Remove and replace regulator screen in the ell.

F. A manifold should be used on all multiple meter sets.

   1. The manifold pipe size shall be 2". This size will be adequate for up to and including 15 AL 250 meters or their equivalent. Installations involving greater capacity shall be sized by the Engineering Department.

   2. Each houseline to be attached to the operator's manifold shall be tagged by the customer to clearly identify the customer to be served.

G. Clean and paint the meter and meter set assembly as necessary, using only approved for above ground UV protective paint, to protect against atmospheric corrosion.

H. Whenever signs of atmospheric corrosion are present, appropriate corrective action shall be taken, up to and including relocating the entire MSA and document findings and disposition on service order.

I. Gas flow and lock-up pressure shall be checked each time a meter is turned on regardless of for how long. The only exception will be during emergency relight.

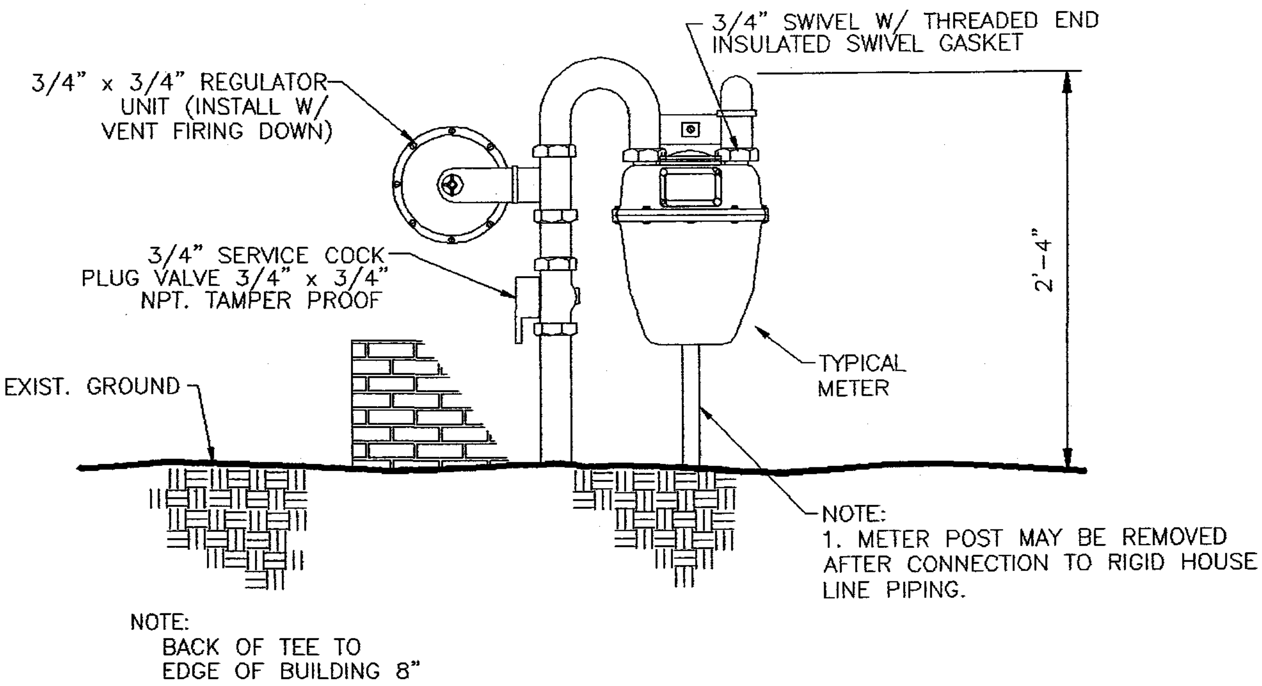
J. Standard customer delivery pressure is 7" water column pressure, or ¼ psig for natural gas and 11' water column pressure for propane gas.

PROCEDURES
METER HANDLING & INSTALLATION

K. Elevated delivery pressure should be restricted to specific gas appliance requirements, and be in increments including 2 psig, 5psig and increased in 5 psig increments only as necessary.

L. Large volume customers may receive line pressure under special circumstances however these instances shall require specialized measuring monitoring equipment.

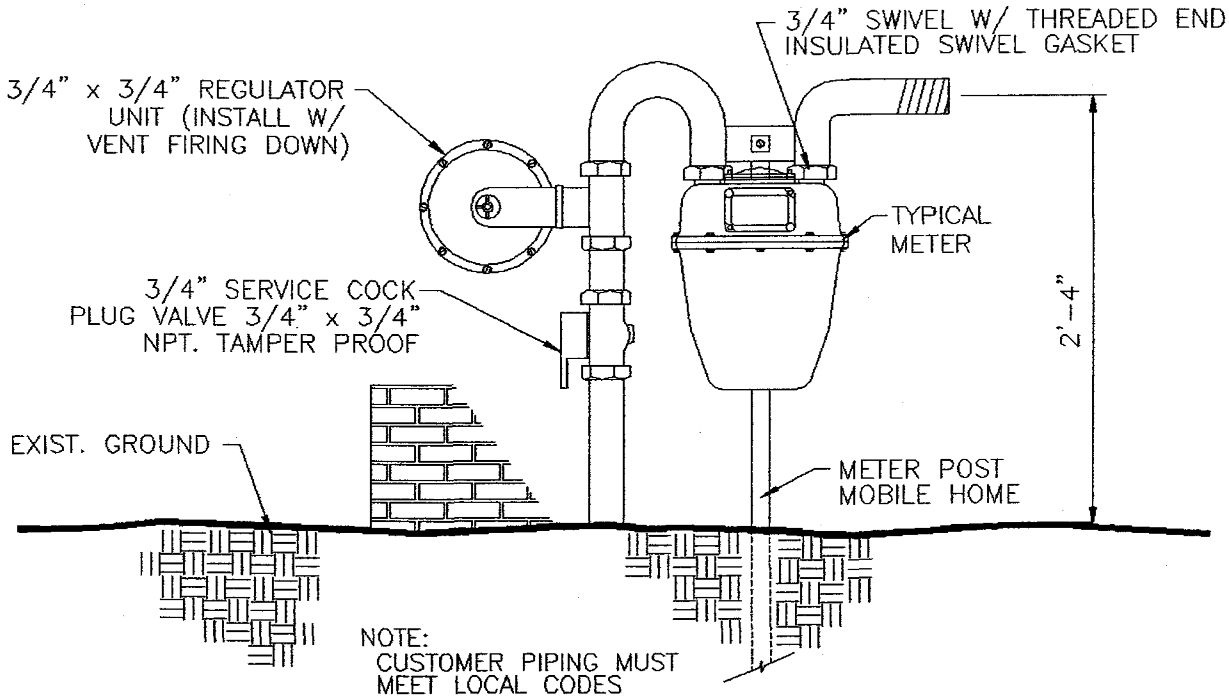
RESIDENTIAL OR COMMERCIAL METER SET



NOTE: CONTRACTOR SHALL INSTALL PRE-FABRICATED METER BAR ASSEMBLY ON RISER. SERVICE COCK SHALL BE LOCKED.

PROCEDURES
METER HANDLING & INSTALLATION

MOBILE OR MANUFACTURED HOME METER SET



NOTE: CONTRACTOR SHALL INSTALL PRE-FABRICATED METER BAR ASSEMBLY ON RISER. SERVICE COCK SHALL BE LOCKED.

PROCEDURES
METER HANDLING & INSTALLATION

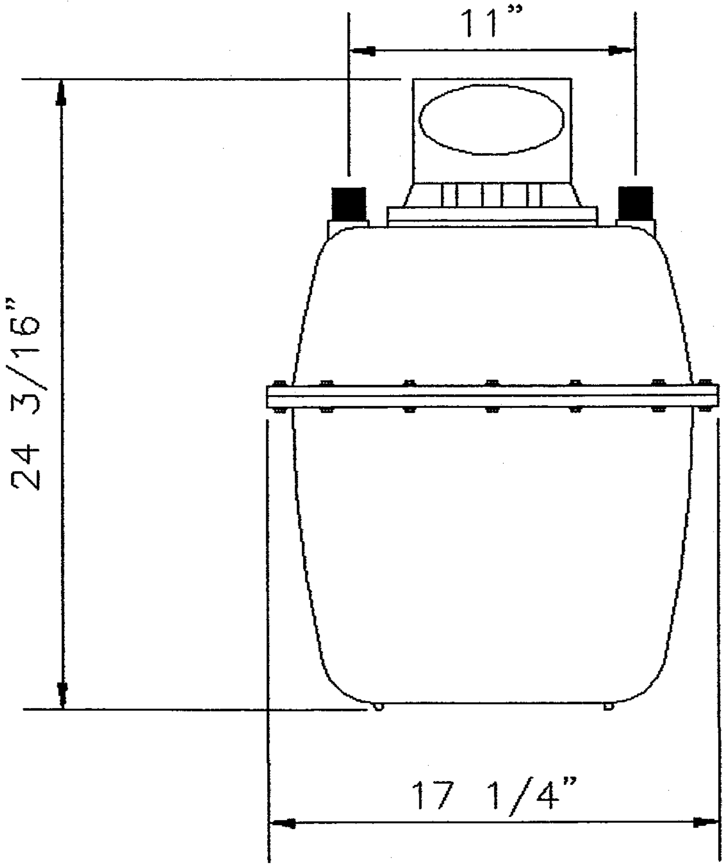
LARGE CAPACITY METER

EQUIMETER 750 OR EQUIVALENT (BULLETIN M-1021)

INLET TO INLET (CENTER TO CENTER)	11"
HEIGHT	24 3/16"
WIDTH	17 1/4"
DEPTH	14 5/8"

DROP

7" WC	1/2" WC		2" WC
MAT	750	-	1600



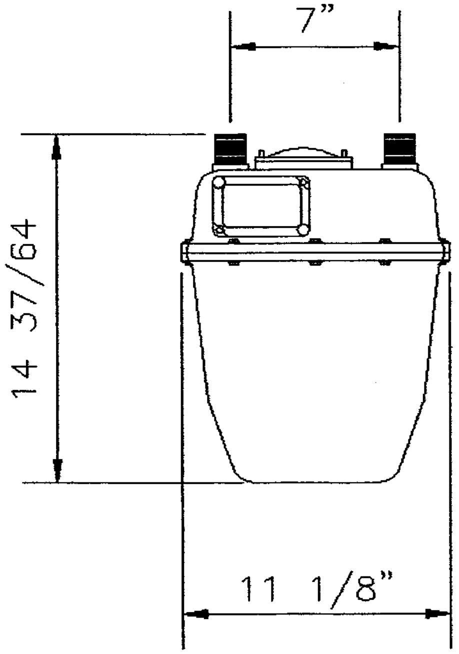
COMMERCIAL METER

EQUIMETER R-415 OR EQUIVALENT (BULLETIN M-1002)

INLET TO INLET (CENTER TO CENTER)	7"
HEIGHT	14 37/64"
WIDTH	11 1/8"
DEPTH	9 3/8"

DROP

7" WC	1/2" WC		2" WC
MAT	415	–	900



PROCEDURES
METER HANDLING & INSTALLATION

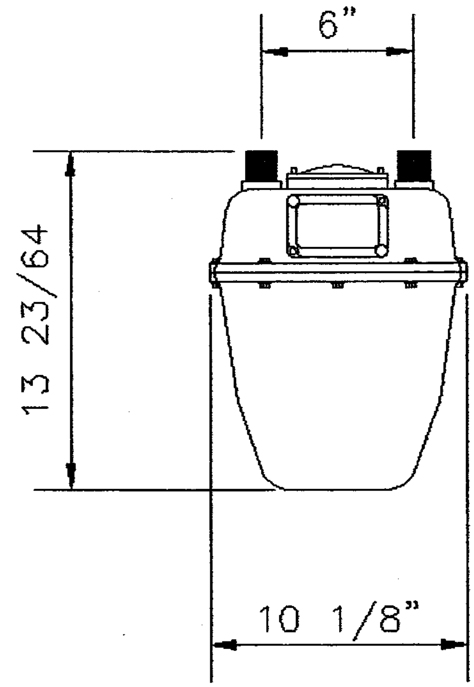
RESIDENTIAL METER

EQUIMETER R-275 OR EQUIVALENT (BULLETIN M-1002)

INLET TO INLET (CENTER TO CENTER)	6"
HEIGHT	13 23/64"
WIDTH	10 1/8"
DEPTH	8 1/2"

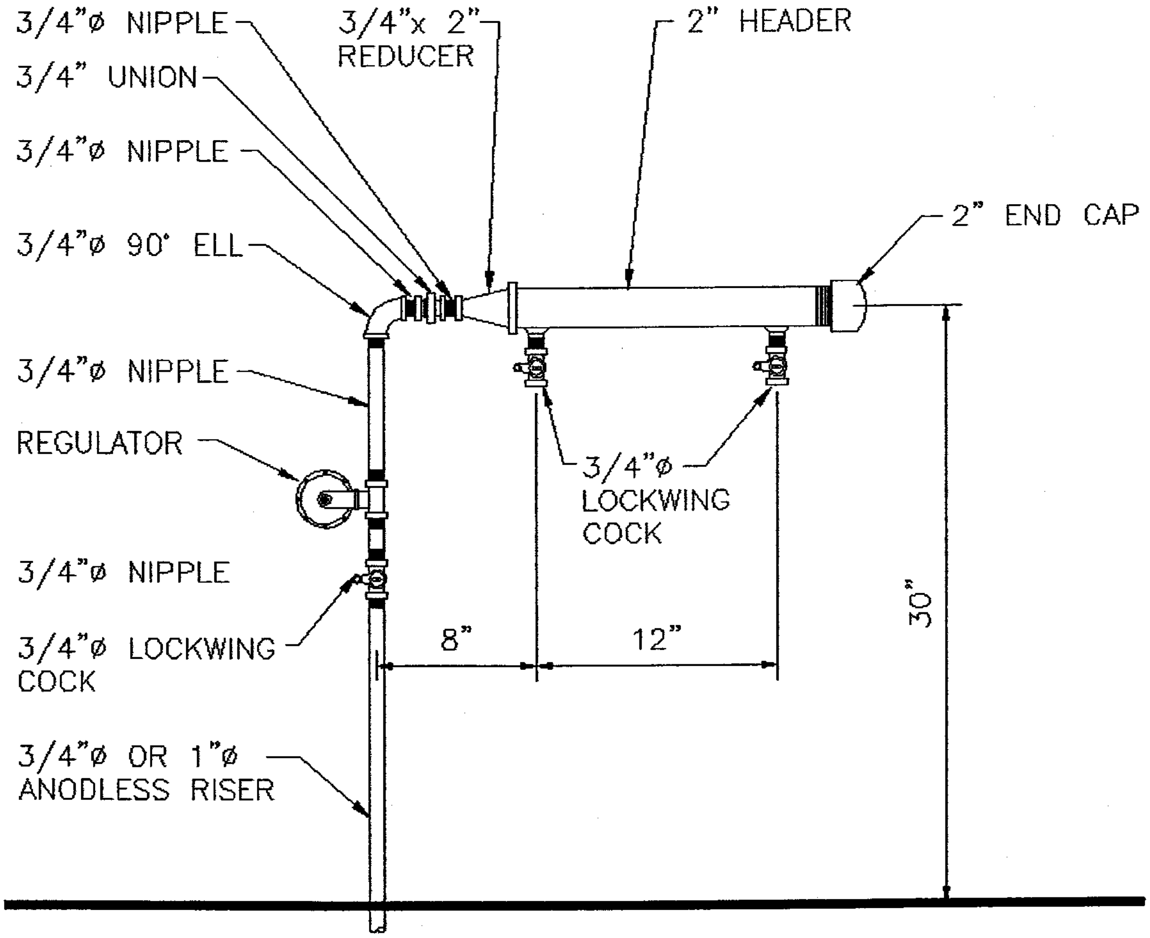
DROP

7" WC	1/2" WC		2" WC
MAT	415	-	900



PROCEDURES
METER HANDLING & INSTALLATION

DETAIL – METER MANIFOLD 2-METER

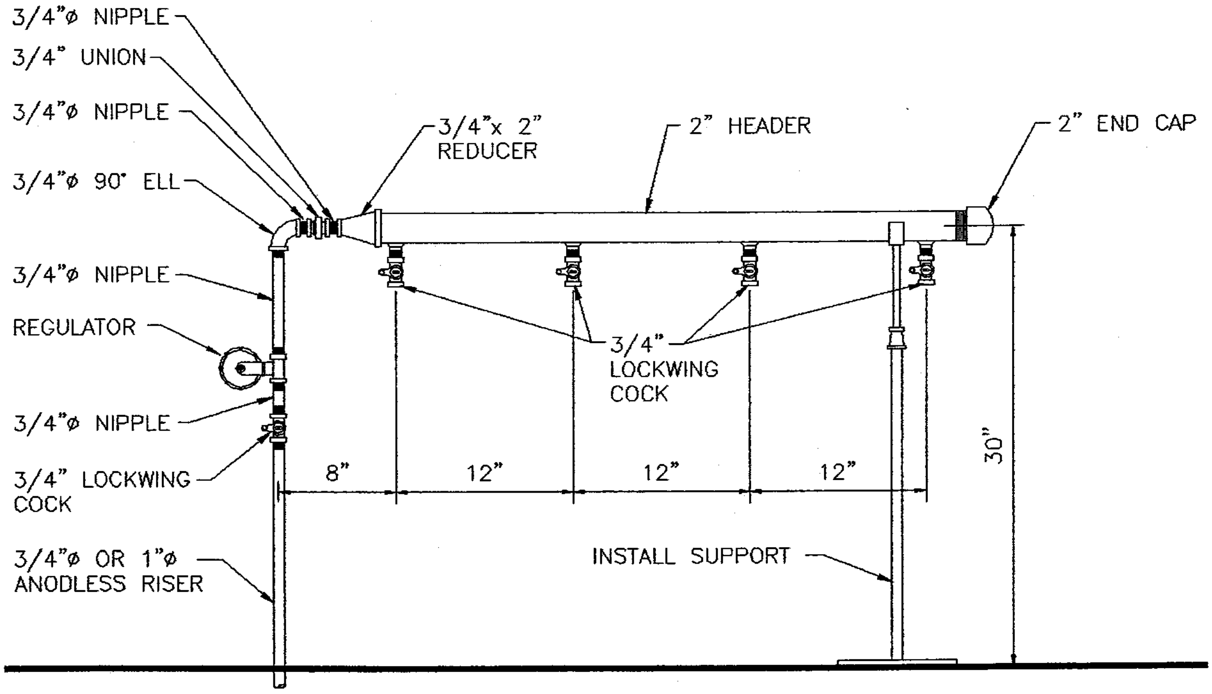


NOTE:

1) ALL FITTINGS AND PIPE ARE THREADED
2) ALL FITTINGS AND PIPEING TO BE PAINTED
3) INSTALL SUPPORT IF NO HOUSELINES CONNECTED AT TIME OF INSTALLATION

PROCEDURES
METER HANDLING & INSTALLATION

DETAIL – METER MANIFOLD 4–METER



NOTE:

1) ALL FITTINGS AND PIPE ARE THREADED
2) ALL FITTINGS AND PIPEING TO BE PAINTED

PROCEDURES
METER TURN-ON & REGULATOR FLOW AND LOCKUP

4.0 PURPOSE (192.461 & 192.463)

The purpose of this section is to establish safe and appropriate meter set turn-on / turn-off procedures.

4.1 SCOPE

A. Meter set assembly turn on

B. Regulator Flow and lock-up

4.2 TURN-ON PROCEDURE

A. Prepare the system downstream from the M.S.A. for the meter clock test by shutting it in the system.
   1. Turn off and plug or cap all appliances at the approved appliance shut-off valve
   2. Remove meter blind(s). (Use approved jumper cables)
   3. Remove the stopcock lock
   4. Turn on the stopcock slowly to avoid damaging the service regulator
   5. Check regulator flow and lock up pressure. Set flow pressure at 7" water column or ¼ psig using a manometer or ounces pressure gauge
   6. Lock up pressure must not exceed 1½ times the flow pressure. If it does the regulator shall be replaced and the defective regulator destroyed

B. Perform the meter clock test (minimum 3 minutes duration) on the downstream system
   1. If leakage is indicated
      a. Soap test exposed customer piping
      b. Identify and repair as possible
      c. Retest the system (minimum 3 minutes duration).
   2. When no leakage is indicated proceed with meter turn-on
   3. The stopcock shall be left off if the leak condition cannot be repaired.
      NOTE: Notify and refer the customer of need for repair

C. Soap test, check all components on the M.S.A. for leakage with liquid leak detector.

D. Clean and paint meter and meter set assembly as necessary to protect against atmospheric corrosion.

PROCEDURES
METER TURN-ON & REGULATOR FLOW AND LOCKUP

H. Light customer appliances as may be appropriate.

4.2 FLOW AND LOCK-UP PROCEDURE

A. Initiate flow through meter / purge
   1. Open test point down stream of meter at tee or outlet swivel
   2. Test dial must be in the upstroke position
   3. Attach manometer or ounces gauge to test point down stream of meter
   4. Adjust regulator to required pressure
      a. 7" water column flow pressure
      b. Lock up pressure not to exceed 1 and ½ times the flow pressure or 10.5" water column
   5. When flow and lockup are satisfactory,
      a. Disconnect manometer or ounces gauge
      b. Restore service to customer

B. If flow and lock up are unsatisfactory, replace service regulator and restart procedure.

C. Advise the customer of service(s) performed before departing.

D. Document all work performed using appropriate form(s).

PROCEDURES
METER TURN-OFF & REMOVAL

5.0 PURPOSE

The purpose of this section is to establish safe appropriate procedures for turning off customer meters, removing customer meter and regulator, and making all conditions safe for the general public.

5.1 SCOPE

A. Turn-Off
B. Meter Removal

5.2 METER TURN-OFF PROCEDURE

A. Verify removal order with customer whenever possible

B. Verify meter number. Record meter number and meter reading

C. Turn-off stopcock

D. Insert meter blind in inlet swivel of meter or disconnect and plug or cap customer houseline. **Jumper cable shall be used to ground MSA before any disassembly of the facility.**

E. Soap test and correct any leakage indicated.

F. Lock off riser stopcock

5.2 METER AND REGULATOR REMOVAL

A. Verify removal order with customer when applicable

B. Verify meter number. Record number and read

C. Turn off stopcock

D. Properly install jumper cable across the MSA before any disassembly or removal is attempted.

PROCEDURES
METER TURN-OFF & REMOVAL

E. Remove MSA and disassemble all fittings from the stopcock to the customer's line. Cap or plug customer's line.

F. Soap test inside core of stopcock for leakage. Repair or replace stopcock as necessary

G. Plug riser stopcock

H. Install lock on stopcock

I. Complete all applicable paperwork

J. Meter and regulator shall be brought to the warehouse no later than the next working day

PROCEDURES
METER BYPASSING

6.0 PURPOSE

The purpose of this section is to establish safe and appropriate procedures for by passing a customer meter.

Contact the customer to explain the work to be performed. Request that the customer keep gas appliance to a minimum until work has been completed.

6.1 SCOPE

A. Meter By-pass
B. By-pass Removal

6.2 BYPASS

A. Check the MSA for any abnormal conditions. Ensure that the work can be completed by means of bypassing. If it can not, notify your supervisor and prepare to turn off the meter.

B. Soap-test the entire MSA.

C. Observe the test dials for minimum registration.

D. Remove plugs from valves "A" and "D." (see bypass methods 1 and 2)

E. Connect bypass including regulator at valve "A".

  1. Use regulator of equal or greater capacity to that of the MSA.

  2. Use approved connectors for bypass.

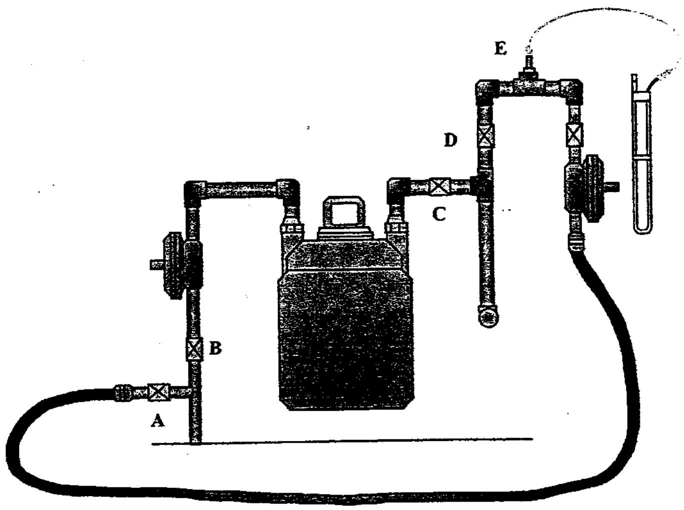
F. Connect bypass at valve "D".

  1. Use hose or pipe of equal or greater capacity to that of the single meter set or to that of the header for multiple meter sets.

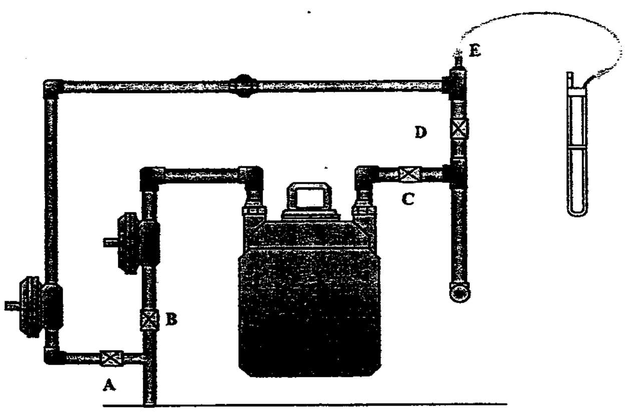
  2. A gauge or manometer connection is necessary on the bypass near valve "D".

PROCEDURES
METER BYPASSING

Method One (Using approved hose)



Method Two (Using solid piping.)



G. Turn bypass regulator adjusting screw counterclockwise until spring is completely relaxed.

H. Open valve "A" slowly and allow bypass inlet pressure to manometer/gauge connection "E". Purge air from the bypass piping or hose.

I. Install manometer or gauge at connection and set flow and lock-up.

J. Open valve "D" and check the MSA regulator delivery pressure.

K. Turn bypass regulator adjusting screw clockwise to raise the houseline pressure ½" water column above set pressure.

NOTE: If house line pressure is in "pounds", raise pressure ½ psig above set pressure.

L. Turn the MSA regulator adjusting screw counterclockwise approximately 8 turns. Observe Manometer/gauge. House line pressure should not decrease.

M. Close valve "B" slowly. Observe manometer/gauge. House line pressure should not decrease.

N. Close valve "C".

O. Change meter.

6.3 BYPASS REMOVAL

A. When the MSA regulator is changed, check the new regulator for proper flow and lock-up pressure.

B. Turn MSA regulator adjusting screw counterclockwise until the spring is completely relaxed, if the regulator was changed.

C. Open valve "B" and allow MSA to purge at the meter outlet swivel, union or purge valve, as applicable.

PROCEDURES
METER BYPASSING

D. Open valve "C" and allow MSA outlet to purge.

E. Tighten meter outlet swivel, union and other purge points.

F. Soap-test MSA.

G. Relight customer appliances.

PROCEDURES
APPLIANCE DERATING & CONVERSION

7.0 PURPOSE

The purpose of this section is to establish safe and appropriate procedures for use in derating new and/or existing customer appliances, and in the proper conversion of existing appliances to an alternative fuel source.

7.1 SCOPE

A. Derating Customer Appliances
B. Converting Customer Appliances

7.2 APPLIANCE DERATTING

Generally, gas appliances Btu/h input rating is specified by the manufacturers for elevations up to 2,000 ft. above sea level. In some locations, appliances may be purchased for higher elevation up to 4000 ft above sea level. If this is the case the elevation must be specified on the appliance.

As the elevation above sea level is increased, there is less oxygen per cubic foot of air; therefore, for satisfactory appliance operation under reduced oxygen situations, the heat input rate should be reduced in those appliances used at higher elevations.

7.3 DERATING FACTOR

A. For elevations above 2,000 feet, reduce the Btu/h input at a rate of 4% for each 1,000 ft. above sea level, unless specified by the manufacturer.

Example: A furnace with an input rating of 80,000 Btu/h at sea level, installed at 4,000 ft. elevation would be 67,200 (4% for each 1,000 ft. of 16%).

Note: The general practice is not to exceed a total of 20% detarion of any appliance.

B. Do not exceed the minimum Btu-h rating specified by the appliance manufacturer if any.

C. All appliances to be de-rated must comply with all applicable codes.

D. When de-rating an appliance, replace the orifice whenever possible. If replacement is not possible, existing orifice(s) may be drilled.

E. Should the appliance Btu/h rating not be known, a clock test performed while the appliance is in normal operation will reveal this information.

7.4 PROCEDURE FOR CONVERTING APPLIANCES

A. The preferred and recommended method to convert an appliance, including appliance listed for LPG only, is to replace the orifice(s) and install a conversion kit, or replace the control. **(Prior approval from Building Department may be required.)**

B. The option to install an appliance regulator upstream of the existing control is an acceptable method of conversion, propane to natural gas. This option should be limited to furnaces and water heaters with inputs up to 90,000 Btu/h. High efficiency furnaces (90 Plus Type) may only be converted by either installing an approved conversion kit or by replacing the control.

C. All appliances to be converted must comply with all applicable codes. Appliance must be listed/certified and have a label or symbol of the organization certifying the equipment. Log lighters are exempt for this requirement.

D. All converted appliances must be identified with an appropriate tag identifying that the appliance has been converted to operate on natural gas or propane as applicable.

F. Always verify the appliance input rating, number of orifices, and regulator pressure for natural gas before proceeding with conversion.

G. Replace orifices whenever possible. If replacement is not possible, existing orifice(s) may be drilled.

H. When re-drilling an orifice, drill in the direction of gas flow whenever possible.

I. To determine the desired input rating per burner, divide the total rated input by the number of orifices.

PROCEDURES
APPLIANCE DERATING & CONVERSION

J. Alterations of an orifice must be done with the utmost care to avoid undesirable flame characteristics. Re-drill again if necessary.

PROCEDURES
STOPCOCK CHANGE OUT

8.0 PURPOSE

The purpose of this section is to establish the minimum requirements for safely changing out a damaged or defective service riser stopcock.

8.1 MAINTENANCE

A. A service stopcock valve found to be leaking may be lubricated and/or tightened to stop the leaking.

B Use only manufacturers recommended lubricant.

C. Caution should be exercised to not overtighten the stopcock thus preventing its intended operation

8.2 REPLACEMENT

A. When a service riser stopcock is found to be damaged or defective the stopcock shall be changed out or the service riser replaced.

B. The service line should be shut down and purged of gas to allow for safe removal and replacement. This may be accomplished by use of a service valve or squeezing.

C. Once isolated, remove and replace the stopcock taking care not to damage the threads or replace the service riser entirely.

D. Check for leakage after reenergizing, and repair as necessary

E. If the service and/or service riser can not be safely isolated, the use of an approved stopcock changer may be required for replacing the stopcock.

8.3 MUELLER NO-BLO VALVE CHANGER

A. Select the proper unit to be utilized according to the size of the stopcock to be removed. Refer to manufacturers Operating Instructions.

B. Close the stopcock, purge gas, and disassemble the MSA

PROCEDURES
STOPCOCK CHANGE OUT

C. Free up the rubber plug by operating it several times before use.

D. Lubricate the rubber plug (Dip in soap solution)

E. Lubricate bleeder "O" rings (apply soap solution)

F. Assemble the plugging unit to stopcock

G. Attach approved safety clamp and jumper cable

H. Insert and expand the rubber plug

I. Remove stopcock

J. Install new stopcock

K. Remove NO-BLOW changer and jumper cable

L. Purge and operate stopcock

M. Lubricate and tighten as necessary

N. Leak check

O. Reassemble MSA

P. Document work on appropriate form.

PROCEDURES
VALVES / GENERAL

1.0 PURPOSE

It is the purpose of this section to introduce the basic types of valves utilized by the Operator and to establish procedures for the installation, operation, and maintenance of valves in the operators system.

The operator shall identify those **Key Isolation Valves** in its system to be utilized for emergency shut-down of the system. The Operator has established a gas system isolation plan for this purpose.

1.1 SCOPE

A. General design
B. Types
C. Installation
D. Maintenance
E. Operations

1.2 GENERAL DESIGN

A. All valve installations will be consistent with the following procedures and documented on appropriate forms to record valve type, flange or weld neck, materials, and valve location.

B. All new sealant injected valves must have packing grease purged out and valve sealant injected at time of installation. Check valve for proper operation after installation is complete. **Use only the valve manufacturer's recommended sealant in the appropriate type valve.**

C. It is recommended that all buried valves include raised heads extensions with 2 inch square head wrench adapter. This will limit variations in valve wrenches required for proper valve operation.

D. Flanged neck valves are approved for aboveground or vault installation and shall not be buried.

1.3 TYPES OF VALVES

The Operator utilizes the following valves in its distribution system. The choice of a valve for a particular location depends on the valve's construction, the design pressure to which it will be subjected and the designed use for the valve.

A. Buried main line valve installations shall be full opening ball valves:
- PE ball valves
- Steel ball valves

B. Aboveground and vault installations may include:
- Steel plug valves
- Steel ball valves
- Needle Valves – Steel

C. Buried service line valve installations may include:
- PE or steel ball valves
- PE or steel excess flow valves

D. Each service line riser shall include an approved for aboveground lock wing service cock.

PROCEDURES
VALVES INSTALLATION

2.0 PURPOSE

It is the purpose of this section to provide the minimum requirements for the installation of valves.

2.1 SCOPE

A. Installation
B. Location
C. Regulator Station
D. Service Valves
E. Excess Flow Valves
F. Buried Valves
G. PE Valve & Valve Box

2.2 VALVE INSTALLATION

Valves shall be approved type and shall be protected from damage and tampering. Valves shall be installed according to the Operator's system criteria. They may be installed above ground, in vaults, or buried. A device to open or close operating valves shall be readily accessible to authorized persons. Each valve must be able to meet its anticipated operating conditions.

2.3 LOCATION

A. Each valve on a main installed for operating or emergency purposes shall comply with the following:
   1. Full opening
   2. Placed in a readily accessible location so as to facilitate its operation in an emergency.
   3. The operating stem or mechanism must be readily accessible.

B. If the valve is installed in a buried box or enclosure it shall additionally comply with the following:
   1. The box or enclosure must be installed so as to avoid transmitting external loads to the main.
   2. Have a raised head extension with common 2" square adaptor head.

2.4 REGULATING STATIONS

A. Inlet Valve: Regulator stations controlling the flow or pressure of gas in a distribution system must have a valve installed on the inlet piping at a distance from the regulator station sufficient to permit the operation of the valve during an emergency that might preclude access to the station (**Recommended 25 LF**).

B Outlet Valve: Each regulator station shall include an outlet valve rated to the MAOP of the Regulator station installed on the inlet piping at a distance from the regulator station sufficient to permit the operation of the valve during an emergency that might preclude access to the station (**Recommended 25 LF**).

2.5 SERVICE VALVES

A. Cast iron gas stops shall only be used aboveground in service and MSA installations.
1. At least one shutoff valve or stop shall be installed in every new, replaced, altered or reinstated MSA in a readily accessible location.
2. Every shutoff valve must be installed upstream of the regulator or, if there is no regulator, upstream of the meter.
3. The shutoff valve shall be designed and constructed to minimize the possibility of the removal of the core of the valve with other than specialized tools.

B. Property line valves shall be installed on service facilities when the service shutoff adjacent to the MSA will not be readily accessible for emergency use. This criteria does not apply to a single family residence.

2.6 EXCESS FLOW VALVE (192.381)

A. Each new residential customer or customer involved in a service line replacement shall be given the option of having an excess service valve installed on his/her service line.

B. Excess flow valve shall be installed as close as practical to the main line connection. **Follow Manufactures Installation Procedure**

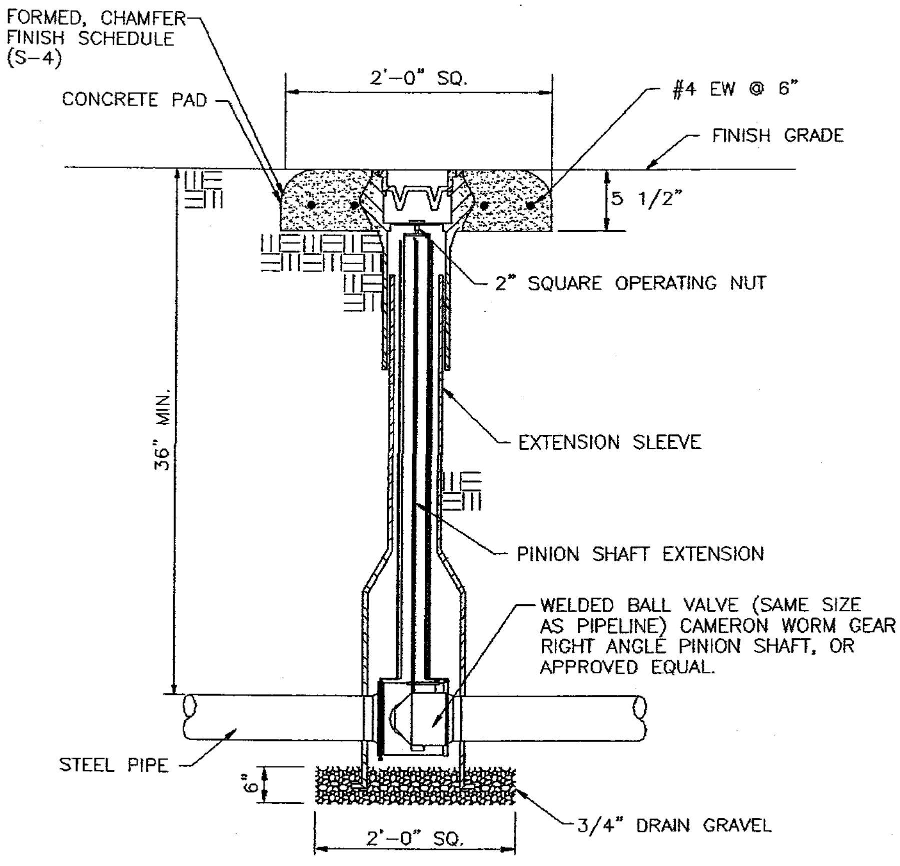
C. Should an unintended closure of the Excess Flow Valve occur, the operator shall test, leak survey or pressure test the service line, to determine the cause of the valve closure, and repair or replace the valve and/or service line as may be necessary.

E. Test service line and as necessary to reinstate service.

F. The customer is responsible for the cost of such maintenance including repairs and/or replacement costs.

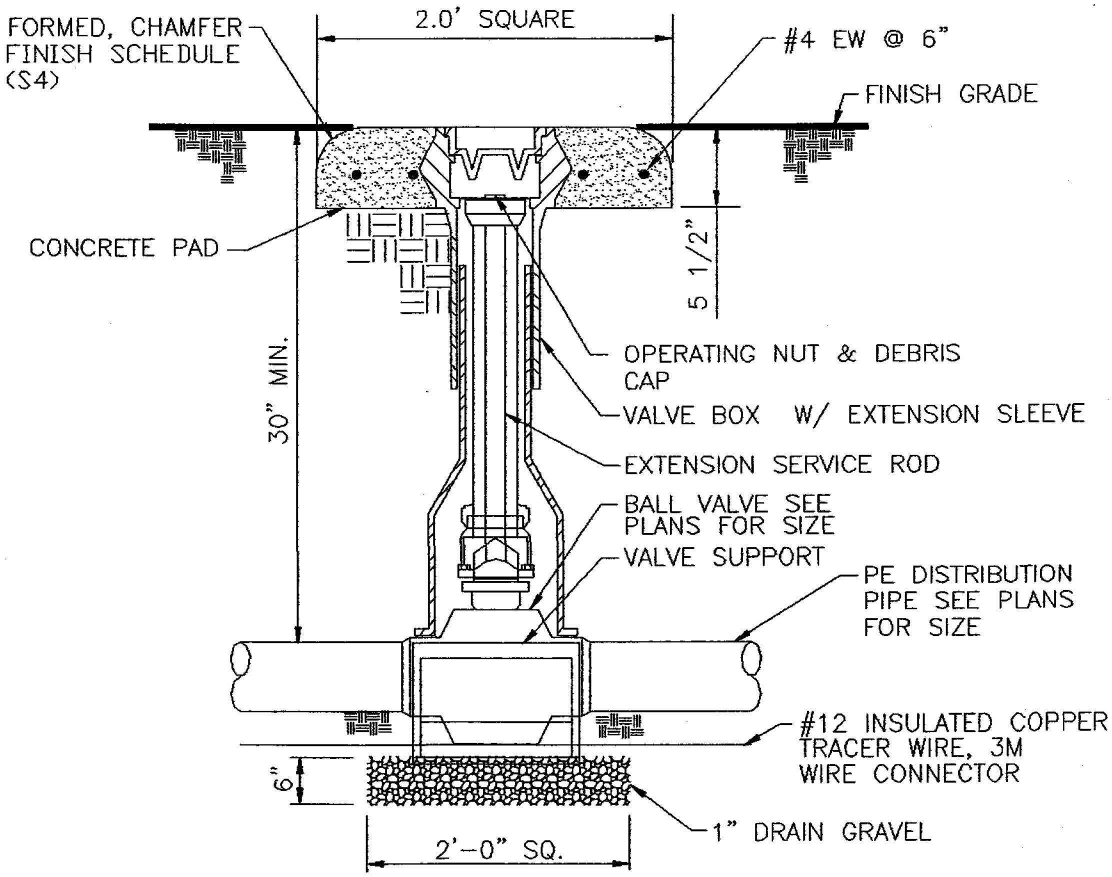
2.7 BURIED VALVES

A. Steel Valves
1. All buried steel valves shall be weld-neck.
2. No flanged or threaded valves may be installed in a buried position other than when installed in a vault.



B. PE Valves

1. Every valve installed with plastic pipe must be designed so as to protect the plastic pipe against excess torsion or shearing loads when the valve is operated and from any other secondary stresses that might be exerted through the valve or its enclosures.
2. Support valve boxes on PE valves independently from the valve or pipeline.



PROCEDURES
VALVE MAINTENANCE

3.0 PURPOSE

It is the purpose of this section to provide the minimum requirements for the maintenance of valves.

3.1 SCOPE

A. Intervals
B Maintenance
C Records

3.2 MAINTENANCE INTERVALS (192.747)

Key valves or Emergency Isolation valves shall be maintained once during each calendar year at intervals not to exceed 15 months or in accordance with stats specific intervals.

3.3 VALVE MAINTENANCE

A. Valve maintenance shall include the following:

1. Verifying the proper valve identification and location detail.

2. Clear the valve box or vault of any debris, which could interfere with or delay the operation of the valve.

3. Check valve alignment for proper position to permit the use of a key or wrench. This includes checking valve box and support for PE valves to ensure not excessive torsion or stress is placed on the pipe.

4. Maintain plug and other lubrication valves by injecting only manufacturer's approved cleaners and/or sealant utilizing a high pressure grease gun.

B. All valve maintenance shall include operation of the valve to ensure its operability.

1. A minimum of 1/8th turn is required for each valve that is a 90 degree positive shut off

2. A minimum of 25% of the turns required for positive shut off of those valves

requiring greater than 90 degree normal shut off.

3. Caution should be taken to return each valve to its full open or full closed operating position, whichever may be applicable.

4. Caution shall be exercised as to not damage the valve stops

3.4 <u>VALVE RECORD</u>

A. Documentation shall include:

1. Valve Maintenance Record – appropriately record maintenance performed

2. Valve Location Record – record or update findings

PROCEDURES
VALVE OPERATION

4.0 PURPOSE

It is the purpose of this section to provide the minimum requirements for the operation of main and service valves.

4.1 VALVE OPERATION

A. Valves are used to control the flow of gas in the system

B. Check the maps and Valve Location Record(s) to ensure the proper valve is being prepared to be operated

C. Verify normal operating position

D. Verify what will be affected downstream of valve when changing normal operating position

E. Verify number of turns required for on / off (Refer to manufacturer's operating procedures)

F Supervisors approval shall be gained prior to the operation of any valve other than during normal annual maintenance

G. Place gauge downstream of valve to verify pressure before operating valve

H. Operate valve in accordance with manufacturer's operating procedure and monitor system

PROCEDURES
TESTING / GENERAL

1.0 <u>PURPOSE</u>
(192.509 & 192.513)
It is the purpose of this section to provide the requirements and procedure for testing gas facilities. The pressure/strength test is by design greater than the desired actual operating pressure of the system. Generally in the distribution system it is accurate to pressure test at 1 ½ times the desired operating pressure but no less than 50psig.

It is recommended that all distribution lines be pressure tested at a minimum of 90 psig allowing for a maximum allowable operating pressure, **MAOP** of 60 psig.

1.1 <u>SCOPE</u>

This section covers the following:

A. Testing Pipeline and Components
B. Damaged or Reinstated lines
C. Locating minor leaks in newly-constructed facilities
D. Odorization
E Pressure gauges and manometers
F. Purging lines
G. Test Records

1.2 <u>GENERAL</u>

A. All newly-constructed or reinstated gas facilities will be tested as required by this section.

B. All piping shall be leak tested at the time of, or prior to placing it in operation.

C. All newly-constructed, replacement, reinstated or relocated piping shall have a pressure stand-up test. A soap bubble test will be considered acceptable for tie-in connections where a pressure stand-up test is not practical.

D. At no time will a pressure stand-up test be less than 90 psig for lines operating at or below 60 psig. **(Refer to Section H-3.)**

E. <u>Do not</u> pressure test against a closed valve, stopper or squeeze that is connected to a live gas line.

F. Do not pressure test through gas meter or service regulator

G. In order to verify that facilities to be tested are isolated, open test connection to atmosphere before connecting test line.

H. Plastic pipe shall be shaded prior to testing and in no case shall the temperature of the pipe exceed 140°.

I. The maximum test pressure for plastic pipe will be 120 psig.

J. The maximum test duration for plastic pipe will be 8 hours.

1.3 TEST RECORDS

A. For all testing, the appropriate form or chart will be completed by the person conducting the test. Documentation shall be reviewed and verified by a qualified individual.

B. Test records shall be maintained for the useful life of the pipeline/pipeline facility.

C. The minimum information on the test documentation is:
   1. The name and signature of the individual performing the test (Include company name if by contractor), and the individual reviewing the record.
   2. Date test conducted
   3. The test medium
   4. The test pressure
   5. The test duration
   6. The test results
   7. Size, type, and length of pipe
   8. It is recommended that a map of the facilities accompany the test record form or recorder chart

PROCEDURES
LEAK TESTING COMPONENTS

2.0 PURPOSE

All fittings for PE and Steel are to be tested as part of the final pressure test for the installation when possible. Fittings that cannot be included in the final pressure test shall be installed in accordance with established procedures and leak tested in accordance with **H-3**

2.1 GENERAL

All natural gas-carrying polyethylene and steel components are in one of the following categories:

1. The component is not delivered from the supplier certified for an MAOP. Until the component is tested by the operator, MAOP is not established. It may or may not have a designated design pressure. These components must be pressure stand up tested after installation as part of a completed assembly or as a single component prior to installation.

2. The component is certified by the manufacturer for a MAOP. These components meet the requirement by complying with one of the following:
   (a) Testing is conducted at the factory according to established requirements.
   (b) A prototype of the component has been tested by the manufacturer and sufficient quality control procedures have been implemented to ensure that each unit is manufactured to the same specifications and quality as the prototype

2.2 POLYETHYLENE COMPONENTS

The following components shall be pressure stand up tested:

1. Pipe.
2. Anodeless risers.

The following components may be installed as a single component without a pressure stand up test. Leak test tie-ins in accordance with **Section H-3**.

1. Mechanical fittings, including couplings, tees, ells, reducers, caps and repair couplings.
2. Tapping tees, including High-Volume and Service tees.
3. Electrofusion fittings.
4. Valves not tested as part of the initial installation.
5. Butt fusion fittings, including ells, tees, reducers and caps.

PROCEDURES
LEAK TESTING COMPONENTS

2.3 STEEL COMPONENTS

The following components must be pressure stand up tested:
1. Pipe, tubing and pipe nipples.
2. Flanges.

The following components may be installed as single components without a pressure test as long as the Manufacturers test/MAOP record can be verified. Leak test tie-ins (Soap Test) in accordance with **Section H-3.3**.
1. Valves not tested as part of the initial installation.
2. Filters and strainers.
3. Flange gaskets.
4. Screwed fittings, including ells, tees, caps, reducers and unions.
5. Regulators, relief valves and automatic shutoff devices.
6. Meters.
7. Bolt-on repair fittings.
8. Pressure and differential pressure transducers.
9. Tubing fittings.

PROCEDURES
PRESSURE TESTING

3.0 PURPOSE

The purpose of this section is to establish minimum procedures for the leak and strength testing of gas pipeline facilities.

3.1 PRESSURE TESTING

Pressure testing plastic mains and service lines, and steel mains and service lines operating at or below 60 psig shall be tested as outlined below:

A. Lines Smaller Than 2" IPS

1. 0 – 100 feet – 10 minutes
2. Over 100 feet – 1 hour

B. 2" Lines and Larger

1. 0 – 1000 feet – 2 hours
2. Over 1000 feet – 4 hours. Not to exceed 8 hours.

C. All above pressure test shall be performed at a minimum of one and one half times the MAOP or a minimum of 90 psig. Recommended test pressure 100 psig.

D. Pressure recording charts shall be used to record the data on any tests exceeding two hours.

E. When pressure testing facilities with pipe sizes in both above groups, the total distance of all pipe shall be included in the higher group.

F. For single components, pre-fabricated assemblies and short sections (less than 125 ft.) of pipe, mixing of test mediums is permissible. (such as nitrogen to top of water)

G. Pipeline facilities to operate above 60 psig shall be tested in accordance with plans developed by the engineer.

H. Prefabricated assemblies shall have a pressure stand-up test.

3.2 LOCATING MINOR LEAKS FOUND DURING PRESSURE TESTING

When a pressure test has been completed and there are indications of a minor leak which was not located during the test, the line may be filled with natural gas by means of a temporary connection at a pressure less than the Maximum Allowable Operating Pressure (MAOP). A flame ionization unit may then be used to search for the leak. After the leak has been found and repaired, retest the line as outlined in this section after purging.

NOTE: This procedure will only be used with supervisory approval.

3.3 SOAP TEST

A. If a pipeline component, other than pipe is installed, pressure testing is not required if manufacturer's testing can be verified.

B. Tie-ins points shall be leak tested at operating pressure, using liquid leak detector.

C. Relocation, replacement or prefabricated piping shall be pressure tested in accordance with H-3.1. Soap test all pipeline connections and tie-ins.

D. Soap test each squeeze point after squeeze is released.

E. Soap test each meter and MSA after performing any work or repair.

F. If leakage is found (indicated by the presence of soap bubbles) replace or repair the component or pipe.

3.4 REINSTATING FACILITIES

All facilities to be reinstated shall be tested as if newly installed. Conduct stand-up pressure test in accordance with this procedure before service is reinstated.

3.5 TESTING TIE-INS

All tie-ins points and repairs, which cannot be pressure tested shall be soap tested.

PROCEDURES
PRESSURE TESTING

3.6 PRE-TESTING PIPE

A. General

When impractical to pressure test pipe after installation, it must be pre-tested. If this option is chosen, the following procedure will be followed. Pre-testing is normally handled by two methods.

1. Job Site Test/Short Pipe Segments

A stand-up test will be conducted prior to installation per H-3.1 of this section. The test pressure, media used, and duration of test will be documented including the signature of the employee/contractor who performed or witnessed the test.

2. Yard Test

Pressure tests will be at a pressure, and time duration appropriate for its intended use as stated in Paragraph 3.1 of this section.

All tests will be documented and will include the pipe manufacturer, manufacturer's lot number, date and start/stop time of test. The chart will be filed for future reference in a specific file for pre-tested documentation.

The tested pipe must be marked or tagged with the test date and the reference number, which is attached to the pressure chart.

When field personnel use the pre-tested pipe, the test date and reference number must be recorded on the appropriate field installation form(s).

NOTE: Any qualified pipe joiner who produces any plastic pipe joint that is found to be unacceptable by pressure testing will not be allowed to perform further production pipe joining in that process until successfully retested and re-qualified in that process.

NOTE: **See H-7** for minimum gauge standards for pressure gauges used for pressure stand up testing.

PROCEDURES
TESTING DAMAGE REPAIRS

4.0 PURPOSE

The purpose of this section is to establish minimum requirements and safe procedures for the testing of damage repairs.

4.1 TESTING DAMAGED / REINSTATED SERVICE LINES

A. The following outlines the conditions for testing damaged service lines requiring shutdown or service lines to be reinstated:

1. Stand-up pressure test the shutdown portion in the same way as a new service before reinstating. Soap test the tie-in connection.

2. Survey service from point of repair to main plus 250' each side of the service along the main using F.I. unit or combustible gas indicator.

B. Testing of damaged services not requiring shutdown:

1. Soap test the damaged portion and/or the repair.

2. Survey entire service plus 250' each side of service along the main using the F.I. unit or combustible gas indicator.

NOTE: Follow up leak investigation shall be scheduled within 30 days of all leak repairs to ensure there is no further leakage.

4.2 TESTING DAMAGED / REINSTATED MAINS

A. Use pre-tested pipe for repair of damaged mains

B. Soap test the tie-in connection

C. Survey main 250' on each side of damage or break, using the F.I. unit or combustible gas indicator

D. Main lines to be reinstated shall be tested in accordance with **Section H-3**
NOTE: Follow up leak investigation shall be scheduled within 30 days of all leak repairs to ensure there is no further leakage.

PROCEDURES
PURGING

5.0 PURPOSE (192.629)

The purpose of this section is to provide minimum requirements and information on purging operations.

5.1 Safety

A. Purge stacks shall be:
   1. Made of steel pipe not plastic.
   2. Properly grounded using ground clamps and ground rod.
   3. A safe distance above the work area. Recommended minimum of 6 ft. above grade.

B. The purge stack shall not be directed at persons, animals or openings to buildings.

C. Appropriate notification to dispatch and neighbors when purging for an extended time.

D. Proper safety precautions to protect people and property from potential hazards shall be implemented.

5.2 PURGE PROCEDURE

The following outlines the methods to be used when purging plastic lines. Lines 4" and larger should have a preplanned procedure for the tie-in and the purge. This procedure will be established prior to starting the work.

A. Purging is the process of expelling air or gas from the pipe or container and replacing it with air or gas. This is accomplished by introducing gas from the normal feed source and allowing the air and any air/gas mixture to escape to the outside atmosphere until 100% gas is obtained or 0% gas when purging with air. The same principles for purging are valid whether gas is used to displace the air or air is used to displace the gas.

B. When purging, it is desirable that the volume of air/gas mix at the junction of the air and gas remain at a minimum. In order to avoid stratification of the gas/air mix, a purge rate of 300 cfm or greater should be maintained.

C. In order to eliminate initial stratification of the air and gas, it is important that the introduction of the gas or air be done quickly. It is desirable to establish the turbulent slug as soon as possible keeping it as small as possible.

D. Purges on all 2" and larger lines shall be checked with a combustible gas indicator (CGI) to ensure that the purge has been successfully completed.

E. For riser purging operation, the riser shall be grounded to the soil with #14 locator wire or jumper cable, along with ground plate or grounding rod. Attach ground wire to stopcock valve or just below the valve to ensure proper grounding. The escaping gas/air mixture shall be expelled in a manner as to prevent the mixture from collecting in a confined area or enveloping the operating personnel.

5.3 PURGING SERVICES

A. Purge service lines a riser.

B. For riser purging operation, the riser shall be grounded to the soil with #14 locator wire or jumper cable, along with ground plate or grounding rod. Attach ground wire to stopcock valve or just below the valve to ensure proper grounding. The escaping gas/air mixture shall be expelled in a manner as to prevent the mixture from collecting in a confined area or enveloping the operating personnel.

PURGE CHART
Linear feet

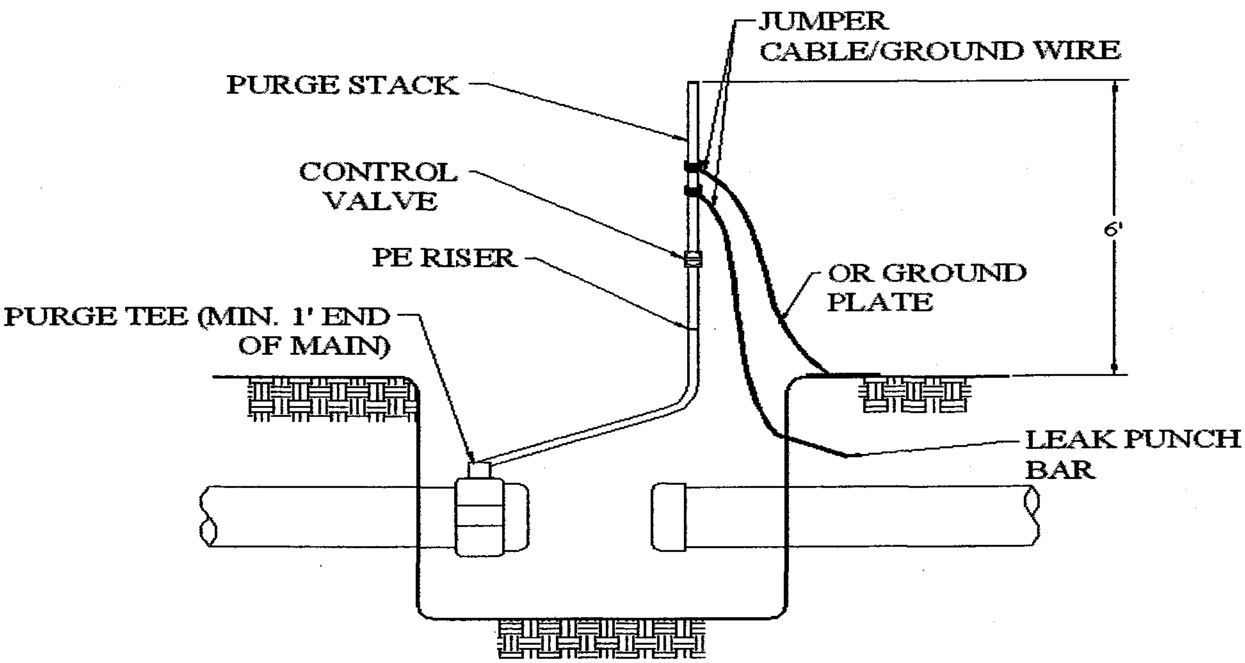
Pipe size	0-100'	101-200'	201-500'	501-1000'
1" and smaller				
Purge time(sec)	10	20	45	90

5.4 PURGING MAINS

NOTE: **Purge fittings shall be installed within 3' of the end of main.**

PROCEDURES
PURGING

FIGURE #1



5.5 ABANDONMENT OF GAS FACILITIES

Each Operator facility or pipeline that is abandoned or inactivated must be completed in accordance with a plan, which shall include the following:

A. Each facility abandoned in place and lines not subject to gas pressure, except when undergoing maintenance, must be disconnected from all sources and supplies of gas, purged of gas, and the ends sealed; however, the line need not be purged when the volume of gas is so small that there is no potential hazard.

B. If air is used for purging, the operator shall ensure that a combustible mixture is not present after purging.

C. Long lengths of main shall be cut and sealed every two blocks, or a maximum of 1,000'.

5.6 Methods for Various Purges

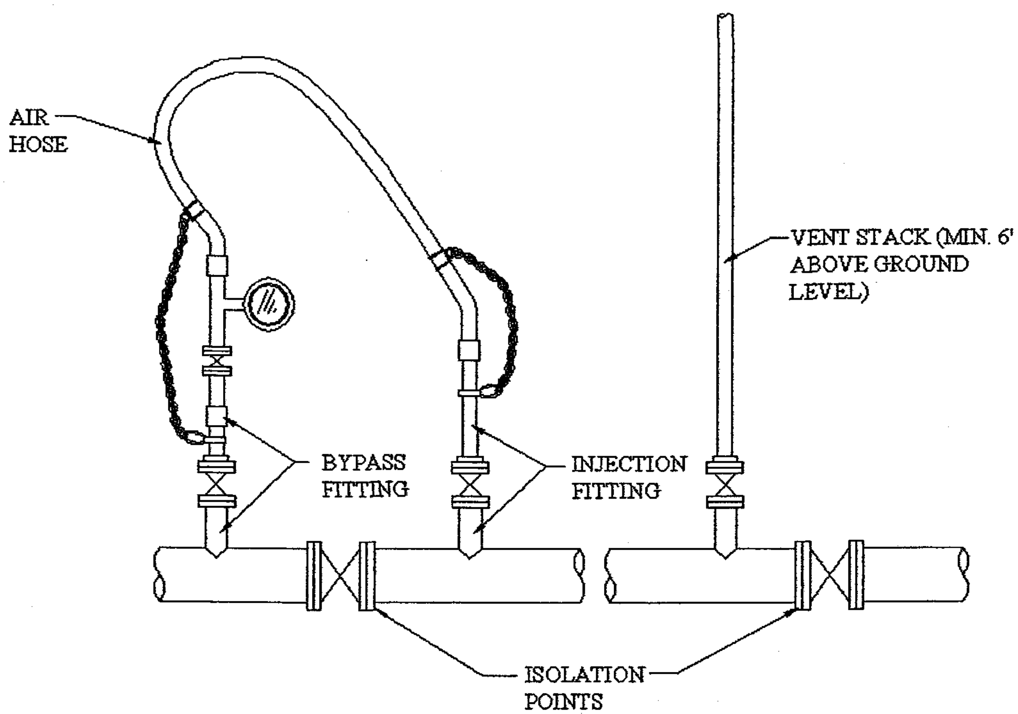
Figures 1 and 2 are typical methods used for various types of purges.

A. Purge Pipeline of Air

It is not necessary to inject gas through a bypass hose when a line valve can be opened at the injection end of pipeline being purged.

FIGURE #2

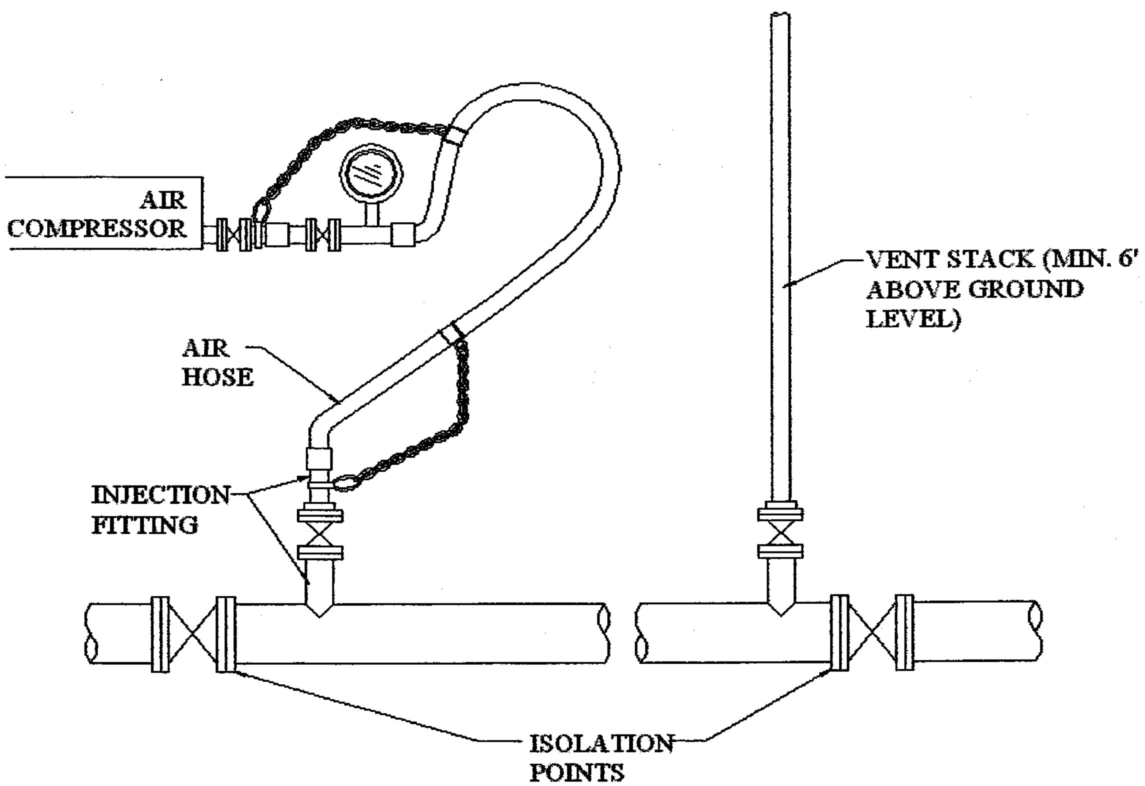
Arrangement for Directly Purging Air from Pipeline



B. Purging Pipeline of Gas

FIGURE #3

Arrangement for Directly Purging Gas from Pipelines



5.7 VACUUM PURGE / EVACUATION

A high vacuum evacuation may be implemented to remove air and moisture from the pipeline system to be commissioned / gassed.

PROCEDURES
PURGING

A. The procedure shall reach a pressure level at which free water begins to boil off (the vapor pressure of water – 0.362 psig at ground temperature, 70 degrees F).

B. After the pressure has been maintained and as water vapor is constantly exhausted, the volume of air in the system will be negligible having been displaced by the water vapor.

C. When all of the water has been evaporated, the final maximum pressure attainable by the vacuum system shall be applied and held until the system reaches a dew point of –40 degrees F.

D. If there is no free water present, the system will reach the pressure attainable by the vacuum system and held until the system reaches a dew point of –40 degrees F.

PROCEDURES
ODORIZATION TESTING

6.0 PURPOSE
(192.625)

The purpose of this section is to establish the minimum requirements for odorization of the gas within the Operators system and the monitoring of appropriate levels of odorization.

6.1 ODORIZATION

Odorant must be detectable at levels equal to 1/5th or 20% of the Lower Explosive Limit (LEL).

The gas supplied to the Operator's system by is either:

1. Pre-odorized by the supplier, or
2. Must be odorized by the Operator.

6.2 ODORIZATION TESTING

Monthly odorization checks will be made at random locations to determine that odorization is maintained at an adequate level.

A. Random location shall represent a new location each month not to be repeated within 12 months.

B. Utilizing an odorometer, a portable, gas odorant detector designed to measure the amount of natural gas in a gas/air mixture as determined by an individual's sense of smell, is an effective means by which to accomplish accurate odorant testing.

6.3 TEST EQUIPMENT SET-UP

The following is a set of general setup instruction for the odorometer:

1. Locate a source of gas, such as a MSA
2. Gas flow should be present and steady when possible
3. Gauge pressure of less than 5 psig is necessary
4. The area must be relatively free of wind currents or odors that may cause errors in the test results.
5. Place the odorometer in a vertical position
6. Connect the odorometer to the gas supply with a approved, non-odor-absorbing plastic tubing such as Bev-o-line®, Teflon®, or Tedlar®.
7. Operators of the odorometer should be selected with due consideration to smoking

PROCEDURES
ODORIZATION TESTING

habits, colds and other conditions of health, since these factors are known to affect the sense of smell. It is desirable to select operators with an average sense of smell in order to obtain reasonably consistent results from the use of this instrument.

6.4 TEST PROCEDURE

Follow to equipment manufacturers operating instructions for the actual test equipment being utilized

1. Should adequate odorant NOT be present, immediately report this to the gas supervisor.
   Utilizing an odorometer, this would be for any reading of
   - **0.90** or higher for natural gas, and
   - **0.42** or higher for propane.

   (Refer to Section P-1.2)
2. Record readily detectable odor/reading on appropriate form
3. The Gas Supplier shall be notified to initiate corrective action should low odorant be indicated.
4. The Operator should routinely monitor odorant levels until normal odorant is achieved.

6.5 HEATH ODORATOR

1. Connect **Sample Hose** to from instrument to gas outlet
2. Gently turn **Flow Adjustment Valve** clockwise until fully closed. **Caution, Do Not over tighten**
3. Push **Power Switch** to ON
4. Open gas supply outlet valve
5. Turn **Flow Adjustment V**alve counterclockwise fully to open the valve. This will condition the Odorator system
6. Wait for about 30 seconds or until you smell an odor of gas at the **Blower Exhaust**, whichever occurs first, then immediately turn the **Flow Valve** clockwise to full close the valve.
7. Push **Read Button** and hold. Adjust **Zero Knob** until the digital display reads 0.00 then release the **Read Button**.
8. Slowly open the **Flow Adjustment Valve** counterclockwise while inhaling (through the nose) approximately ¾" above the **Exhaust Port**.
9. When you smell a detectable / readily perceptible odor, push the **Read Button** and record gas present reading.

10. Close gas supply outlet valve
11. Disconnect **Sample Hose** from the gas outlet and the instrument
12. Fully open **Flow Adjustment Valve** counterclockwise and leave instrument on for approximately 1 minute after the test to purge the instrument.
13. Store with **Sample Hose** disconnected and **Flow Adjustment Valve** open.
14. Document findings using form(s)

PROCEDURES
PRESSURE GAUGES

7.0 PURPOSE

To provide standardized intervals and the required maintenance for the inspection and calibration of pressure devices used for pressure stand up tests on distribution facilities.

7.1 APPLICATIONS

A. Gauges should be selected for their specific application

B. The desired pressure to be gauged should fall within the mid range of the selected gauge. (i.e. operating pressure at 50 psig, appropriate gauge should be 0 to 100)

7.2 APPROVED STANDARDS AND ACCURACY

A. Field Operating Standards shall have a minimum accuracy of ±1.0 percent full scale or full range for standards, including:

7.3 CALIBRATION SCHEDULES

A. Field Operating Standards shall be inspected and calibrated every six (6) months or replaced as necessary.

B. Gauges should be sent the manufacturer or an independent agency for calibration.

7.4 OPERATING REQUIREMENTS

A. Do not transport Field gauges in vehicle cabs or bins unless stored in an approved carrying case, such as:

B. Check and adjust zeros before using at each location.

C. Install vertically all bourdon or spring-type pressure gauges.

D. Tap bourdon or spring-type pressure gauges at each pressure setting to overcome minor binds. Replace gauges when heavy tapping is required to obtain desired setting, or jumping of the pointer is observed during pressure setting changes.

E. Have all Field Operating Standards inspected and calibrated against a Primary

Standard when it has received damage, suspected to have received damage, or does not operate properly.

F. Do not disassemble or attempt field repairs of standards.

G. For the most accurate reads, use pressure standards which correspond to stand up test pressures below.

1. Bourdon or spring-type gauges:

Test Pressure (PSIG)	Maximum Gauge Range (PSIG)
1-24	0-30 or 0-60
25-50	0-60 or 0-100
50-90	0-100 or 0-200
90-180	0-200 0r 0-400

7.5 CALIBRATION REQUIREMENTS AND TOLERANCE

A. Pressure standards shall be calibrated using the following number of pressure settings during the calibration process. Pressure settings established for the calibration will ensure that the full range for the gauges is covered.

NOTE: The standard being used for calibrating a device has to have a higher accuracy than the accuracy to which the device is being calibrated to. For example, a Field Operating Standard with a manufacturer's stated accuracy of ±1.0 percent of full scale cannot be calibrated to that accuracy with a Primary Standard having the same ±1.0 percent of full scale accuracy.

1. Gauges ranging from 0 to 15 psig shall be calibrated at four (4) different pressure settings.

2. Gauges ranging from 0 to 60 psig shall be calibrated at six (6) different pressure settings.

3. Gauges ranging from 0 to 200 psig shall be calibrated at seven (7) different pressure settings.

NOTE: **Gauges that measure both inches of water column and psig shall require separate calibration in both modes.**

B. Repair or replace standards that are found outside the manufacturer's stated accuracy for the specific device and cannot be calibrated to tolerances.

7.6 RECORD KEEPING REQUIREMENTS

The Operator shall maintain a record of the calibration and maintenance performed on standards. The serial number and/or utility number with the vehicle number and/or technician assigned to the standard shall be recorded. Maintain a record of calibration and maintenance history for each device on appropriate form.

PROCEDURES
MANOMETER / OUNCES GAUGE

8.0 PURPOSE

The purpose of this section is to establish procedures for using the manometer or ounces gauge for pressure checks involving low pressure gas downstream of the meter at less than 1 psig.

8.1 MANOMETER PROCEDURE

A. Uncap tubes on manometer

B. Check fluid levels. Use only approved Manometer Fluid or distilled water. **Do not use antifreeze.**

C. Adjust to zero range with manometer in the vertical position using both sides of U Tube.

D. Connect tubing and manometer downstream of regulator on customers piping

E. Keeping manometer in vertical position, introduce gas pressure into the manometer

F. Allow fluid to settle and total readings above and below zero

G. Make necessary adjustments to regulator to achieve proper water column inches

H. Disconnect manometer and cap

I. Always transport manometer in upright position

8.2 LOW PRESSURE GAUGES

A. low pressure gauges measuring gas pressure in ounces may be substituted for the manometer.

B. Always transport ounces gauges in appropriate, protective caring case.

PROCEDURES
CARBON MONOXIDE (CO) TESTING

9.0 PURPOSE

The purpose of this section is to establish procedures for investigating and testing for the presence of carbon monoxide in the environment.

9.1 SCOPE

Carbon Monoxide (CO) poisoning results in flue like symptoms, and prolonged exposure or exposure to high levels of CO may result in death.

A. As little as 10ppm needs to have the source identified and corrected

B. 50ppm (0.005%) is the maximum allowable concentration for continuous exposure in any eight (8) hour period

C. 800ppm (0.08%) may cause unconsciousness or death within two (2) hours

9.2 CO PROCEDURE

A. Verify with customer / occupants the presence of any CO symptoms

B. Is CO suspected from a specific appliance or for other reason?

C. If conditions safely allow, verify the presence of CO conditions:
   1. Test for CO with a Carbon Monoxide tester or Monoxor.
   2. Take reading outside before entering structure to establish normal level of CO present in atmosphere.
   3. Take reading inside front door, near heat registers, near appliances, and at various locations throughout the structure, both near the floor and the ceiling.

D. If the test indicates the presence of CO instruct the occupants to:
   1. Ventilate the structure
   2. Get fresh air
   3. IF CO is strong, advise occupants to leave the building, and
   4. Return only after the CO problem has been repaired

E. If conditions safely allow, check for the following:

1. Proper appliance combustion, and
2. Proper flue operation:
   - No holes or cracks, correct rise, and no spillage
3. Fan blowing through the heat exchanger
4. Proper burner flame pattern
   - Heat exchanger (with burners off and fan on):
   - Visually check with match, mirror and light
   - Probe rusted areas to determine extent of damage
   - If the heat exchanger is cracked or unsafe, shut off the gas and electric to the furnace and red tag deficiency.

F. If the cause of the CO cannot be eliminated, shut off the natural gas supply, ventilate the structure, and issue Notice of Unsatisfactory Condition

NOTE: The above guidelines are general in nature and its primary use will be for the training of personnel prior to emergencies. During an actual emergency, the personnel responding to the emergency will be required to exercise their individual judgment to take the appropriate actions considering all apparent circumstances.

9.3 BACHARACH MONOXOR II

A. Install four (4) "C" size batteries, checking for proper polarity

B. Install hose and probe, insuring snug fit.
Dish washing liquid diluted in water or heating the tube in hot water may help when installing for the first time or after long period of nonuse.

C. Set power switch to ON, allowing approximately 1 minute to warm up

D. Zero the display (if necessary)

E. Take a gas sample

F. The LCD shows levels of CO in the Range of 0 to 1999 ppm
1. If a display of "1" in the left column is present, this represents an overrange condition.
2. To clear an overrange condition, leave the instrument on and sample fresh air until the display returns to displaying CO

PROCEDURES
CARBON MONOXIDE (CO) TESTING

3. Should the instrument not clear, send it to an approved Bacharach Service Center for repair

G. When batteries become low, the LO BAT indicator appears in the display. The instrument will continue to take accurate readings, however the batteries should be replaced as soon as possible.

H. A -1 display indicates batteries to low to continue. Batteries shall be replaced before proceeding.

I. To perform a quick check of the instruments operation, use a burning cigarette, a snuffed out match or bottled CO. If no reading or reading obviously in error, do not use the instrument and send in for repair.

J. It is recommended that the instrument be scheduled for routine calibration on an annual basis not exceeding 15 months of operation. If the Operator does not have the necessary calibration equipment, the instrument should be sent to an approved Bacharach Service Center.

PROCEDURES
Future Use

This Section Is Held For Future Use

PROCEDURES
LEAKAGE / GENERAL

1.0 PURPOSE

It is the purpose of this section to provide minimum requirements and information on leakage detection equipment, leakage classification, leakage locating, and centering of leaks.

1.1 SCOPE

This section covers the following:

A. Flame Ionization Unit
B. Leakage Survey
C. Combustible Gas Indicator
D. Determining Leak Spread
E. Leak Classification
F. Marking Leaks
G. Centering Leaks
H. Purging Bar Holes

1.2 GENERAL

Two primary types of detection equipment are utilized for the determination of underground gas leakage.

1. The flame ionization unit is used to detect the presence of hydrocarbons and is calibrated to register the particular gas in parts per million.
2. The combustible gas indicator is used to classify gas leaks. The CGI or gas scope is calibrated to register percent of the L.E.L. and percent gas.

PROCEDURES

FLAME IONIZATION (FI) / LEAK SURVEY

2.0 PURPOSE

The flame ionization unit (FI) is designed to detect the presence of hydrocarbons in concentrations ranging from 1 PPM to 100,000 PPM. The unit is used for scheduled, random, and miscellaneous gas leakage surveys. The FI unit is **not used** for gas leakage classification.

2.1 FLAME IONIZATION UNITS

A. Each of the following FI units is approved for use by the Operator and its contractors, for use in conducting leakage surveys.
1. Southern Cross 400
2. Heath Detecto-Pac II and III
3. GMI FI2000

B. FI units shall **Not** be used in closed environments where a potential explosive atmosphere may exist. The FI unit, because of its internal flame, is a potential source of ignition.

C. The reference gas utilized by the FI units shall be certified 40% Hydrogen and 60% Nitrogen

D. Always turn on and zero FI in a nonflammable atmosphere (clean air)

E. Always check for physical damage and/or missing parts before beginning

E. **Heath Detecto-Pac II and III:**
1. Check batteries and change if necessary
2. Check reference fuel and fill in necessary (never below 50 psig)
3. Install the fuel cylinder in place and turn on (do not over-tighten)
4. Check for clean inlet filter (change daily or more often if necessary)
5. Attach probe
6. Depress on/off test switch
7. Press battery test switch
8. Depress 10K ppm switch (allow I minute for fuel to purge)
9. Press igniter switch, continuous flameout alarm should stop within 25 seconds, this indicates ignition
10. If alarm does not go off repeat step until alarm stops
11. Allow 5 minutes warm up time.
12. Release 10K switch

PROCEDURES

FLAME IONIZATION (FI) / LEAK SURVEY

13. Zero instrument using zero control knob
14. Check pulsating signal alarm by pulling up on yhe zero knob then slowly rotating the knob clockwise until pulsating alarm sounds (the pulsating alarm should turn on at meter reading between 35 – 45% of full scale. Return meter reading to zero.
15. Verify unit is operational checking sensitivity with a small sample of know gas at the inlet (50ppm). Meter should swing upscale and return to zero
16. Set unit to gas range to begin survey

Note: at higher altitude, above 3000 ft, a slightly richer reference fuel mixture may be necessary (42% hydrogen / 58% nitrogen)

F. **Southern Cross 400:**

1. Check Batteries and replace if necessary
2. Check reference gas and fill if necessary (minimum 800 psig)
3. Install the fuel cylinder in place (do not over-tighten)
4. Check for clean inlet filter (Change daily or more frequently if necessary)
5. Attach probe
6. Open reference fuel valve (listen for hissing of moving gas)
7. With zero adjust knob fully counterclockwise, turn power switch on
8. LED and alarm should come on and stay on
9. Press the ignitor switch, alarm and LED should go off within 3 seconds
10. If not wait 5 seconds and try again
11. If LED and alarm stay on, FI unit is in need of further repair
12. When both go out, slowly rotate the zero adjust knob clockwise to 100 and then counterclockwise to zero
13. Adjust alarm point (should be between 40 and 50%)
14. Anytime you note that the alarm point has dropped for 4-8%, the batteries need to be replaced
15. Extinguish the flame by placing you thumb over the intake. LED and alarm should come on within 3 seconds. Reignite the unit.
16. Check for leaks in the sample system by removing the probe. LED and alarm should come on within 3 seconds. Reinstall the probe.
17. Turn zero knob fully counterclockwise, wait 5 seconds and reignite the unit
18. If any of these tests fail further repair is required
19. Perform calibration bump test with known gas sample (50ppm gas)
20. Set unit to gas range to begin survey

G. **GMI FI200:**

1. Check Batteries and replace if necessary
2. Check reference gas and fill if necessary
3. Install the fuel cylinder in place (do not over-tighten)

PROCEDURES
FLAME IONIZATION (FI) / LEAK SURVEY

4. Check for clean inlet filter
5. Check that exhaust gauze assembly is clean and securely fitted
6. Open reference gas cylinder and wait 10 seconds before turning unit on
7. The instrument will begin its start up sequence (approx 30 seconds)
8. LED Illuminates, alarm sounds FLAME flag flashes and reading falls for near 10 to zero
9. When start up is successfully completed LED is extinguished, flame out alarm is silenced, FLAME flag disappears and current gas reading is displayed
10. If start up fails, follow steps again. If still unsuccessful, FI unit may require further repair.
11. Allow 15 minutes for warm up
12. Zero the instrument; **Press and Hold the Zero button** (This must be done in clean air)
13. Perform bump test with know gas sample (100ppm methane)
14. Set unit to search range to begin survey
15. Adjust alarm set point to as sensitive as practical

2.2 <u>LEAKAGE SURVEY</u>
(192.723)

A. The operator shall conduct a gas detector leakage survey of all exterior pipeline facilities of the operators system at the following intervals:
   1. Business District: Once each calendar year not to exceed 15 months.
   2. Outside of Business Districts: As frequently as necessary but at intervals not exceeding 5 years. It is recommended that the operator survey a minimum of 20% of its system each year with the entire system to be completed within 5 years.

B Leakage surveys and leakage grading shall be performed by qualified personnel.

Grade 1 leak: Requires immediate and continuous action until corrected.

Grade 2 leak: Shall be scheduled for repair as soon as practical and shall be reevaluated at a minimum of every 30 days.

Grade 3 leak: Shall be scheduled for repair as soon as practical and shall be reevaluated at a minimum of every 12 months.
(Refer to Section J-5)

C. Operator and contract personnel conducting leakage surveys shall check calibration on the F.I. units (according to the operator's manual) each day they are used and document the results.

D. Proper field use of the instrument to conduct a leakage survey should be as follows:

1. When surveying, the range switch should be on its most sensitive range.
2. The technician should be looking for gas vent points and not necessarily limited to the area directly over the main. In many cases the main is located in a paved street where no gas vent points are nearby. The technician should search out all adjacent cracks and other surface structures, such as water meter boxes adjacent to the gas main or service to be inspected.
3. On lawns or unpaved areas, the operator will survey directly over the main to get best results. On testing around exposed piping, such as gas meters, the operator should not specifically test each fitting, but slowly wave the test probe over the meter set.
4. Paved areas and areas with water puddles will not vent freely. A meter movement indicates the presence of hydrocarbons, especially one that activates the audio signals by exceeding a preset threshold level. When this occurs the operator must backtrack several feet and re-inspect the area (being careful to reproduce the previous inspection exactly) in order to define the actual venting point of the leakage indication. The magnitude of the meter response may suggest a temporary reduction in sensitivity so that more accurate centering may be accomplished. At this point, the soil atmosphere shall be tested with a conventional, combustible gas indicator. It must be kept in mind that both the paving and surface opening are apt to greatly influence the amount of gas in the atmosphere. Although paving will reduce the concentration, street openings will tend to increase it beyond that level, which normal venting through the soil would produce.
5. In other areas where motor vehicle traffic is prevalent, or where other exhaust producers are present, the possibility exists of meter indications occurring which have no relationship to the hydrocarbon-carrying lines being inspected; however, since contaminants are rarely found in detectable concentrations at the surface when an inspection is being done, false indications have not been a problem. The retracing procedure will quickly confirm the existence of hydrocarbons.
6. Indications of the presence of hydrocarbons detected by the F.I. unit will cause the technician to place bar holes so that the presence of hydrocarbons can be confirmed by the use of the Combustible Gas Indicator, CGI. Enough bar holes shall be placed to determine the amount of leakage and the extent of the area in which leakage is present and to determine the grade of leak found.

PROCEDURES
FLAME IONIZATION (FI) / LEAK SURVEY

2.2 SAMPLING PRECAUTIONS

A. The flame ionization unit is not to be used as a measuring device and is not to be used in manholes or confined areas to measure for explosive gas. A combustible gas indicator (CGI) should be used for this purpose. The readings obtained with a flame ionization unit are not accurate above 400 parts per million. It may flame out, at or near the lower explosive limit.

B. The flame ionization unit is designed as a surface sampling instrument.

C. When a scheduled leakage survey is conducted using the hand held portable flame ionization unit, the technician of this unit shall record the wind velocity every 2 hours using an appropriate wind velocity gauge. Leakage survey may become ineffective in wet or windy conditions. The technician's good judgment should be used to determine an adequate survey. Whenever the wind velocity is in excess of 20 miles per hour, the scheduled leakage survey shall be discontinued.

D. Whenever a scheduled leakage survey is conducted by the mobile unit, the technician of this unit shall record the wind velocity on the appropriate leak survey form every 2 hours by using a wind velocity gauge. The wind velocity readings shall be taken within 3' of ground level. Whenever the wind velocity is in excess of **10** miles per hour, the scheduled survey shall be discontinued.

E. In addition to heavy winds, the unit should not be used in heavy rains or where there is standing surface water on the pavement or areas to be surveyed. Water may damage the unit, and will tend to temporarily seal the gas vent points. The unit can however, be used in light rain and where this buildup has not occurred.

PROCEDURES
COMBUSTIBLE GAS INDICATORS (CGI)

3.0 PURPOSE

The combustible gas indicator unit (CGI) is utilized to center, determine leakage spread and to classify gas leakage. The unit may be used for gas leakage investigations and leakage surveys.

Operator and contract personnel using CGI's shall check and record calibration regularly

3.1 SCOPE

The combustible gas indicators are designed to:

A. Determine whether gas is present in a manhole, basement, underground or other confined space.
B. Provide means for classifying leaks.
C. Check for completion of a purge.
D. Center leaks.
E. Determine leakage spread

3.2 COMBUSTIBLE GAS INDICATOR

A. The combustible Gas Indicators is a two-scale instrument.
   1. One scale indicates gas from 0% to 5%, or percent of Lower Explosive Level (L.E.L).
   2. The second scale reads gas concentration directly from 0% to 100% gas in air.

B. Technician must check calibration on the CGI units regularly and document the results. **Follow the specific manufacturer's procedures.**

C. Zero the unit prior to each usage.

D. Check bar holes, cracks and other possible vent points.

E. Determine leakage spread **Refer to Section J-4**

F. Center and classify leakage **Refer to Sections J-5 & J-6**

G. Should leakage be determined to be potentially hazardous, take appropriate action to protect life and property **Refer to Section B-3 & Section Q**

H. It is important to clear the unit (pump air through the unit) between each check.

I. When using only the combustible gas indicator unit for leakage survey, good judgment should be used to determine the number of bar holes to provide an adequate survey and perimeter of leakage migration.

J. Combustible gas indicators can be used to differentiate natural gas from condensable hydrocarbons (gasoline) with the installation of a hydrocarbon filter (charcoal) on the instrument

3.3 <u>MSA GASCOPE</u>

A. Leak, flow and calibration checks shall be made not less frequently than **monthly**.

1. Calibration Check:
    a. Turn unit on and set to LEL range
    b. In fresh air, squeeze the aspirator bulb 8-10 times
    c. Unit must reset to zero on both scales
    d. On LEL scale check reading against know sample of gas 2% methane
    e. On gas scale check reading against 100% gas (pipeline gas may be used)
2. Leak Check:
    a. Seal inlet fitting
    b. Squeeze aspirator bulb
    c. Immediately seal outlet of aspirator with thumb
    d. Bulb should remain deflated for a minimum of 10 seconds
    e. If not repair is required
3. Flow Check:
    a. Squeeze aspirator
    b. Bulb should re-inflate within 1 to 2 seconds
    c. If not, replace filter
    d. Disconnect aspirator bulb tubing from outlet fitting and remove regulating orifice to verify that it is open
    e. I clogged, insert no. 23 gauge wire through the opening
    f. Reconnect and recheck
    g. If aspirator bulb still does not inflate in 1 to 2 seconds, further repair is

required

B. Do not operate on LEL in oxygen deficient (less that 10% oxygen) area as the meter may not give accurate readings

C. This instrument is not intended for testing mixtures of hydrogen, acetylene, or other combustible gases, in which the oxygen content exceeds that of normal air.

D. Even though the instrument responds to such combustibles gases as propane, acetylene, gasoline or solvents, it provides accurate measurements of only the specific gas for which it is calibrated.

E. The use of a standard cotton filter in the sampling line is recommended to protect the instruments for possible damage caused by sampling leaded petroleum products. Change the cotton filter

F. An activated charcoal filter may be installed in place of the cotton filter to separate petroleum products being sampled. If the readings are less than those indicated without the charcoal filter, then the sample contains petroleum.

G. **CGI Model 62S Operation** (Manually aspirated unit)
1. Set range switch to LEL
2. Set on/off switch to on
   - BATT indicator should be well into white
   - READY should turn on within approximately 4 seconds. If not, replace batteries
3. Squeeze aspirator bulb 8 to 10 times in fresh air to purge the instrument. Bulb should fully re-inflate within 2 seconds
4. Lift and turn outer sleeve and adjust LEL control to zero indication on meter
5. Attach sampling line, probe and filter cartridge if necessary
6. Set RANGE switch to GAS
7. When READY indicator turns on, Lift and adjust GAS ZERO control to obtain zero indication on meter.
8. In area(s) to be tested, squeeze aspirator bulb nine or ten times to draw adequate sample into instrument.
   - When the needle stabilizes, the meter indicates the concentration of

gas in air in percent by volume.
- Meter indications are valid only when READY indicator is on.

9. When wet weather conditions exist, caution should be taken to prevent liquids from being drawn into the instrument.
    - Do not allow end of probe or sampling line to touch liquids
    - Use closed end probe
    - Install line trap
10. If meter indication is less than 5, set range to LEL. The meter now indicates the percent LEL.
11. If indications of gas leakage are present:
    - Center leak **Refer to Section J-6**
    - Grade Leak **Refer to Section J-5**
12. Take appropriate action to protect the general public **Refer to Section B-3 & Section Q**
13. Record all readings and findings on appropriate forms and maps

H. Refer to the equipment manufacturers operating instruction manual for further detail in operating and maintaining this equipment.

3.4 <u>Bascom-Turner Gas Ranger</u>

A. The Gas Ranger is an automatic CGI
1. Auto Zero
2. Auto Calibration
3. Auto Sampling
4. Auto self-tests

B. These Detectors are capable of detecting natural gas, carbon monoxide, oxygen and H_2S

C. Check the instrument you are utilizing to determine its exact capabilities

D. Operation
1. Turn the unit on
2. The unit will run trough its automatic start up functions
3. If the unit is not operating properly it can not complete this start up
4. Pump check:
    - Block the inlet probe, if *"bloc"* does not appear on the display

- Tighten connections and retest
- If *"bloc"* still does not appear, block directly at inlet fitting
- If *"bloc"* still does not appear, do not use the unit until further repair is completed

5. If everything checks out unit is ready
6. Check and clean dust and water-block filters regularly by removing and tapping it on a hard surface. Do Not insert object as this may damage the filter.
7. Filters typically need replacement twice a year

E. Test and Calibration: Perform monthly

1. Use know gas sample consisting of 2.5% methane
2. Always pure the unit in gas free environment when complete

F. Set range to gas and begin leak investigation

PROCEDURES
DETERMINING LEAK SPREAD

4.0 PURPOSE

This section provides minimum requirements for determining leak spread and placement of bar holes

4.1 SCOPE

A. FI unit may be used to determine the general area of leakage spread at the surface.

B. A CGI shall be used to:

- Determine the amount of leakage.
- Determine the extent of area involved.
- Determine the class of leak found.

4.2 FIELD PROCEDURE

The placement of bar holes and observing of readings with a CGI will continue until the perimeter of the leak has been well defined as rapidly and thoroughly as possible.

Indication of the presence of hydrocarbons shall cause the technician to place bar holes so that the presence of hydrocarbons can be confirmed by use of a combustible gas indicator (CGI)

Good judgment shall be used to determine the number of bar holes to provide an adequate survey. The absolute minimum number of bar holes placed will be determined by the following:

A. Bar holes shall be placed along the pipeline at a maximum of 20-foot intervals until gas readings are zeroed (2 consecutive readings of 0) using a CGI.

B. Any service line within the leakage area shall be bar holed at a maximum of 20-foot intervals until gas readings are zeroed (2 consecutive readings of 0) using a CGI.

C. Against structure foundations and around the perimeter of affected structures until gas readings are zeroed (2 consecutive readings of 0) using a CGI.

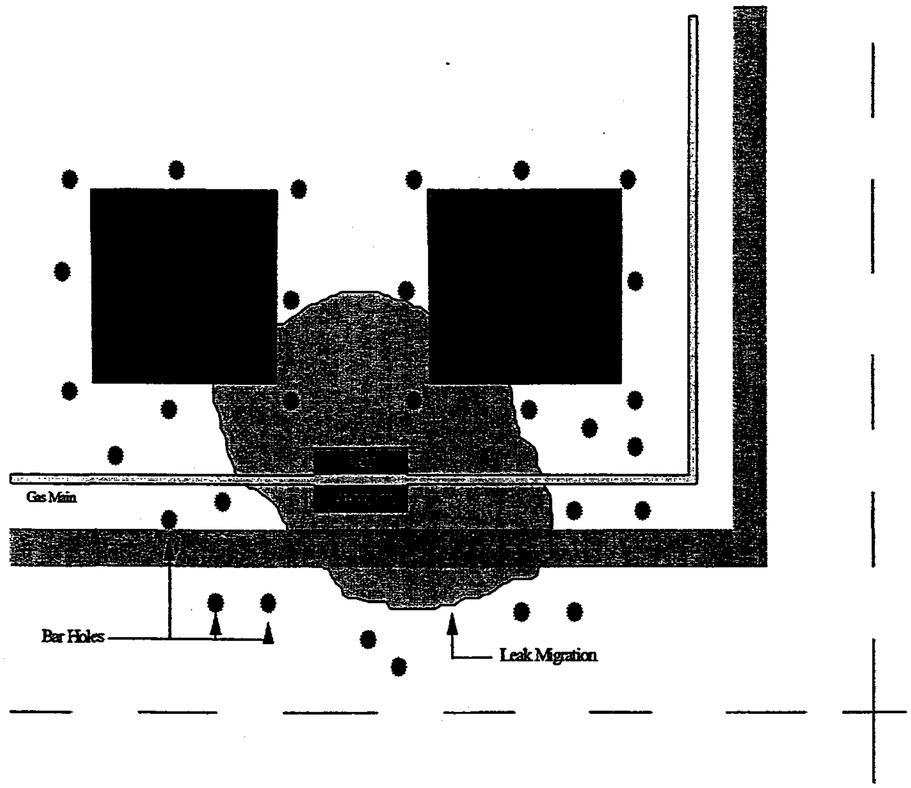
PROCEDURES
DETERMINING LEAK SPREAD

D. When evaluating any gas leak indication and the leak area extends to a building wall, the leak investigation shall continue into the building whenever possible, using a CGI.

E. The placement of bar holes and taking of samples with a CGI will continue until the perimeter of the leak spread is well defined.

F. Readings should be documented on appropriate forms.

FIGURE 1



G. When evaluating gas leak indication and the leak area extends to a building wall, or substructure where persons may enter, the leak investigation shall continue inside whenever possible.

H. Record all findings on appropriate form(s)

PROCEDURES
LEAKAGE GRADING

5.0 PURPOSE

The purpose of this section is to establish the most appropriate procedures to be undertaken in response to any indication of gas leakage.

5.1 SCOPE

All leaks on Operator facilities are assigned priority classification according to the following:

A. Location
B. Spread
C. Gas concentration
D. Possibility of gas accumulation
E. Possible sources of ignition
F. Imminence of hazard to the public or property

5.2 LEAKAGE PRIORITY

A. Each leak priority code has a maximum time limit for corrective action. Priority classification is based on relative degree of hazard and the examples are listed for each Leakage Grade.

B. The person evaluating the leak, after considering the primary criteria listed, will determine the grade of the leak. The leak Grade shall be documented on the appropriate form(s).

C. All leak repairs will have a follow-up inspection to ensure that all leakage has been repaired. This should be done while the excavation is open.

D. In the case of residual gas, a follow-up survey should be made no later than 30 days following a repair.

5.3 GRADE I

A grade I leak is any leak that has conditions that pose an immediate or imminent hazard to people or property**. <u>Immediate action shall be taken to repair Grade I leaks</u>**, and Dispatch shall be contacted immediately. **<u>Continuous Action</u>** shall be taken until the leak source is accurately located and the hazard has been eliminated. Continuous action includes monitoring area of leakage for possible gas migration. Examples may be, but are not limited to:

A. Leaks blowing at the surface.

B. Gas in or under any building.

C. Gas indications underground adjacent to any buildings:

1. Within 5' when not paved;
2. Within 10' when paved;
3. Within 50' of a school, hospital, theater or other places of public assembly.

D. Concentrations of 1% gas (20% LEL) or greater in excavations, substructures, confined spaces or enclosures which personnel can enter.

E. 1% gas (20% LEL) or greater confined space containing electric connections or other sources of ignition.

F. Leakage which, because of public concern or location, may be considered hazardous to persons or property.

5.4 GRADE II

A Grade II leak is one that has conditions that may be considered a potential problem, but is obviously not an immediate or imminent hazard. These conditions shall be reported at the end of the working day in which they were encountered**. Grade II leaks shall be repaired or reevaluated every 30 days** after detection until repaired, or no longer result in a reading, within 12 months of date reported. Examples may be, but are not limited to:

A. Concentrations below 1% gas (20% LEL) in excavations, substructures or enclosures which personnel can enter.

B. Gas indications underground adjacent to any building:

1. Between 5' and 25' when not paved.

2. Between 10' and 50' when paved.

3. Between 50' and 100' of a school, hospital, theater or other place of public assembly.

C. Leaks requiring elimination prior to construction or reconstruction of streets, highways, buildings or underground construction.

D. Leaks affecting vegetation.

5.5 GRADE III

A leak that is non-hazardous at the time of detection and can be reasonably expected to remain non-hazardous. **Each Grade III leak should be reevaluated during the next scheduled survey** or within 15 months of the date reported, whichever occurs first, until the leak is reclassified or no longer results in a reading. All leaks not classified as Grade I or Grade II will be classified as Grade III. Examples may be, but are not limited to:

A. Any reading of less than 3% gas (60% LEL) in small, gas-associated substructures.

B. Any reading under a street in areas without wall-to-wall paving where it is unlikely the gas could migrate to the outside wall of a building.

C. Any reading of less than 1% gas (20%LEL) in a confined space.

PROCEDURES
CENTERING LEAKS

6.0 PURPOSE

The purpose of this section is to establish procedures for centering a gas leak to determine the safest way to locate and repair the leakage source.

6.1 SCOPE

A Centering
B. Marking
C. Recording

6.2 CENTERING LEAKS

A. Locate and mark the gas main, gas services and other substructures in the area.

1. Drill or punch offset bar holes at approximately 6' intervals along and on alternate sides of the main both ways from the leak indication. Where lateral connections to the main are located, drill on the lateral side.

2. Sample bar holes and record findings immediately after drilling until 2 consecutive readings of 5% gas or less are obtained in both directions.

3. Determine extent of leak spread

4. Recheck bar holes to establish center area

5. Grade leakage

6. Mark the point of highest reading for excavation and repair

B. Where definite peak area cannot be established, purge each bar hole to reduce gas concentration.

1. Suction bar holes

2. Recheck bar holes to establish approximate center area

3. Grade leakage

4. Mark the point of highest reading for excavation and repair

C. If a definite peak still can not be established:

1. Drill or punch bar holes on alternate sides along main or service at 2' intervals for a distance of 12' in each direction from the approximate center.

2. Check each bar hole within the 24' distance and record readings

3. Establish approximate center area

4. Grade leakage

5. Mark the point of highest reading for excavation and repair

D. Record findings, including all gas test readings, on appropriate form(s)

PROCEDURES
MARKING LEAKS

7.0 PURPOSE

This section provides the minimum requirements regarding the marking of leakage on site and documentation of the event.

7.1 SCOPE

A. Marking maps
B. Field markings

7.2 MARKING LEAKS

A. The survey technician will mark maps and appropriate forms to show the location of all leaks found.

B. The survey technician will clearly mark the site at which the leaks were found:

- Paved Areas - Paint
- Unpaved Areas – Paint, feather nails, or stakes

C. Field markings will also include indications of readings at each bar hole location.

PROCEDURES
PURGING BAR HOLES

8.0 PURPOSE

Purging is an efficient method of centering. The 2 methods used to purge bar holes of the leak centering patterns are by suction, or venting.

8.1 SCOPE

A. Bar hole suction method

B. Venting

8.2 SUCTION METHOD

A. The suction method should be used on each bar hole for a minimum of 30 seconds. The maximum time will depend on the amount of gas concentration and soil conditions.

B. The aerators have a 9/64" hole drilled in the gate of the 1/2" valve.

C. With the valve closed, this 9/64" orifice allows the proper amount of air to pass for maximum vacuum with direct pressure from the compressor.

D. After the aerator is installed in the bar hole, it may be necessary to clear the 1/4" pipe inlet.

E. On high-pressure mains, this may be done by simply plugging the outlet of the aerator and turning on the air for an instant.

F. On Low-pressure mains, the soil sampling device may be used to clear the bar hole before inserting the aerator to prevent clogging.

8.3 Venting

A. The amount of time the bar holes are left open is dependent on
   - Location of the bar holes,
   - Gas concentration
   - Work routine of the crew

PROCEDURES
PURGING BAR HOLES

B. Air Mover

This practice covers the use of the venturi-type air mover when used for aerating gas concentrations from the ground.

- When a gas leak occurs, it will migrate away from the leakage area in the path of least resistance. Therefore, the placement of the air mover is very important to reverse this migration of gas back to the point of origin and to release gas concentration into the atmosphere.
- Before starting air mover, plug all bar holes in the ground and around the buildings with soil or cold-mix asphalt (where required).

NOTE: The only hole in the ground or escape route for the gas should be at the excavation where the repair was made.

C. 0% Gas Read

- Aerate with the air mover on, with all the bar holes plugged, until 0% gas reads are obtained with a combustible gas indicator adjacent to any structures.
- When a 0% read is achieved, continue aerating, open the bar holes and take reads with a CGI. If the reads are 0% gas, stop aerating and wait approximately one hour and recheck bar holes to determine if additional aeration is required. If additional aeration is required, re-plug the bar holes and continue running the air mover.
- When it has been determined that all leakage is controlled, and hazardous concentrations adjacent to structures have been eliminated, the area can be declared safe. Recheck the next day for buildup of gas concentrations. If buildup is found, repeat aeration procedure.

PROCEDURES
LEAKAGE INVESTIGATION

9.0 PURPOSE

When gas odor/leak calls are received, time is of the essence. Answer the call as quickly as possible. Gas odor/leak calls have **Top Priority** over all other work.

9.1 SCOPE

A. Odor Investigation

B. Dig-In Procedure

C. Fire / Explosion

D. No Gas / Low Pressure

E. Gas Outage

9.2 GENERAL

A. Upon arrival, always park/stage upwind, uphill or upstream of the situation

B. **Reference Emergency Response Plan**

9.3 LEAK / ODOR CALL

A. Gas leaks may be located, or determined to be present, by sight, hearing, smell, application of liquid leak detector (**Soap Test**), use of appropriate leakage detection equipment, meter clock tests, or pressure tests.

B. Leak investigation shall not be terminated until the point of origin of the uncontained gas has been located or the source of odor has been identified or positively determined not to be natural gas. If NO leakage is found and NO odor is present, the leak investigation must include the following:
1. Park at a safe distance away from the leak.
2. Pressure test for flow and lock-up when conditions permit.
3. Meter clock test. If conditions do not permit a clock test, turn meter off until such time as a clock test or other appropriate test for leakage can be performed.

4. Soap test MSA
5. Leak survey of Operator-owned underground facilities.

C. Inside Leak Investigation, use CGI.

1. Clear the unit outside in uncontaminated air before entering.
2. Do not use FI inside of any structure until it has been demonstrated that no explosive mixture of natural gas exists.
3. Check for the presence of gas at the entrance to the building and periodically throughout the structure including gas appliances, heat registers and in each room.
4. Gas at .5% LEL inside a structure is generally considered hazardous

D. If in the judgment of the utility personnel, a hazardous atmosphere exists

1. Ask all occupants to leave the building.
2. Turn off gas at the MSA.
3. Notify Dispatch if assistance is required.
4. Eliminate possibility of ignition
5. Ventilate the building, if possible
6. Notify the Fire Department for ventilation, if necessary
7. Notify the Police Department if area access control is necessary.

E. If, in the judgment of the Utility Personnel, no hazardous atmosphere exists, proceed with leak investigation

1. Perform a CGI leak check at the following locations:
   - At the point of entry of all underground utility services (gas, water, etc.)
   - All drains
   - At the top of all exterior walls, basement and or building walls from inside the building
   - All cracks in the floor or exterior basement walls
   - In crawl spaces or other openings below the floor in basement less buildings
   - Outside, over the service line, and around the building walls, within one foot of the building wall
   - All down spouts which are connected to underground drains
   - Soap test visible customer gas piping, appliance shut-offs and appliance connectors

2. If leakage found make repairs as appropriate
3. If repairs can not be made:
   - Isolate (shut off) appliance
   - If unable to isolate the leak, shut off the gas meter
   - Red tag the appliance or other deficiency
4. Eliminate potential sources of ignition
5. Open windows and doors to ventilate the building

G. If unable to complete a leak investigation because you are unable to or denied access to the site, take the following actions:
1. Contact office for management assistance.
2. Lock off meter
3. Conduct a leak survey around the perimeter of the incident scene as close as possible to the site
4. Periodically check with the authority in charge of the site until access can be gained

H. If there is positive indication of underground leakage which cannot be controlled by turning off the meter, request appropriate assistance from dispatch.
Immediate action is required for all Grade I leaks

I. <u>Outside Gas Leak Investigation</u>
1. Clear and zero the Combustible Gas Indicator in uncontaminated air
2. Check for the presence of gas at:
   - The point of entry of all underground utility services (gas, water, wastewater, etc.)
   - At nearby buildings
     - All drains
     - The top of all exterior basement and/or building walls from outside of the building
     - All cracks in the pavement or exterior basement walls
3. Continue away from the structure to check:
     - Gas, electrical, water, telephone and sewer manholes,
     - at cracks in the pavement and sidewalks, and at other locations providing an opportunity for finding gas leaks
4. Determine the extent and migration pattern of the leak then take the necessary actions to make the situation safe
5. Center and locate the source of the leak. If construction and excavation

activities are required contact Blue Stakes and monitor the situation until excavation can commence

6. Excavate near the foundation of involved structures to ventilate gas
7. Maintain communications with office
8. Continue actions until natural gas is eliminated and repairs made.
9. It is good practice to make a final leak check at or near the service riser or structure before leaving regardless if leakage has been found elsewhere

9.4 DIG-INS

A. Take the necessary actions to make the situation safe. Protect life first, then property and the environment.

B. Advise the dispatcher of the actual field situation and request necessary assistance and equipment as may be required.

C. If fire or police are present on site, report to the Incident Command Post and provide all necessary assistance.

D. Follow approved procedures for the control of the gas flow.

E. If a gas service outage will result. **Refer to Section J-9.6**

F. Follow approved procedures to locate and repair the damaged facilities.

G. Document all corrective actions on appropriate forms

H. Maintain communications with Dispatch and report all appropriate information

I. Leak survey all natural gas facilities within 250 feet of the incident damage. **Refer to Section J-2.**

9.5 FIRE / EXPLOSION

Each fire or explosion occurrence shall be investigated to determine to what extent gas may have been involved if at all.

A. Take the necessary actions to make the situation safe.

B. Advise the Dispatcher of the actual field situation and request assistance when necessary.

C. If Fire or Police are on site, report to the Incident Command Post and provide necessary assistance

D. Shutoff gas supply

E. Shutoff service valves to building(s)

F. When required, shutoff gas supply at main.

G. If natural gas is suspected, check for underground gas leaks

H. Evacuate personnel if gas concentrations exceed 1 % gas in air (10,000 PPM) in the general atmosphere

I Locate and repair the leak

J. Collect and retain any evidence

K Record corrective actions taken

L. Maintain communication with Dispatch and report all appropriate information

9.6 NO GAS / LOW PRESSURE

No gas and or low pressure may be as a result of gas leakage or the malfunction of a pipeline facility component. Each such occurrence shall be investigated to determine the cause of the no gas or low pressure and to take the necessary corrective action.

A. Customer call
1. Determine cause of no gas/low pressure:
2. Verify meter is on
3. Check meter and regulator functions, set and lock up pressures
4. Check individual appliances and shut off valves
5. Check for restricted houseline

6. Check for leakage
7. Rectify situation as may be appropriate.

B. If situation cannot be rectified:
1. Isolate appliance, tag deficiency
2. Shut off and lock and blind meter, tag deficiency
3. Request assistance as may be necessary

C. If gas outage is suspected, **Refer to Section 9.6**

9.7 GAS OUTAGE

An outage call shall be considered an emergency and a priority.

A. Determine the boundaries of the outage and the number of meters involved.

B. Conduct investigation as necessary to determine the cause of the outage. Investigation shall include but not be limited to:
1. Valves in proper positive
2. Pressure reducing station malfunctions
3. Significant leakage
4. Damaged facilities

C. Repair or correct the situation

D. Determine manpower requirements and call for assistance as necessary

E If gas outage is involved

1. Turn off gas service valves at each service in the affected area.
2. Advise appropriate civil authorities of the emergency when necessary.
3. Initiate re-light procedures

PROCEDURES
SOAP TEST

1.0 PURPOSE

It is the purpose of this section to provide standard procedure for performing a soap test to determine if gas leakage is present.

1.1 SCOPE

This section covers the following:

A. Liquid leak detector

B. Soap test procedure

C. Applications

1.2 LIQUID LEAK DETECTOR

A. Liquid leak detector specifically designed for natural gas leakage investigation is commercially available

B. In the absence of LLD, a mixture of liquid soap (dish soap or other) may be mixed with water for use as the LLD. (12 to 1 mixture is sufficient)

1.3 PROCEDURE

A. Apply sufficient amount of liquid leak detector (soap)

B. Ensure complete coverage all around the fitting or component be checked

C. Cupping you hand under and behind the component may help to ensure compete coverage

D. Visually inspect the component for the presence of bubbles indicating leakage

E. The use of a small mirror may help to see under and behind the component being checked

1.4 APPLICATIONS

A. MSA

B. Visible customer owned facilities (i.e. pipe, appliance shut off, appliance connector and appliance burner tubing)

C. Tie-in connections

D. Fittings under pressure

E. Welds under pressure

F. Regulator vents

G. Squeeze points

PROCEDURES
PIPE LOCATING / GENERAL

1.0 PURPOSE
(192.614)
It is the purpose of this section to provide safe and appropriate procedures for locating and marking pipelines.

1.1 SCOPE

This practice covers the following:

A. Locating Requirements.

B. Operation and procedures for Locating Pipelines

C. Marking Pipeline Locations

D. Pipeline Markers

1.2 RESPONDING TO LOCATION REQUESTS

A. State law requires that the Operator of buried gas facilities actively participate in a "One Call System" where available.

B. Federal Standards have been adopted establishing the appropriate color for marking each utility location. The standard for gas is **YELLOW**.

C. The gas utility and other utility operators are responsible under the line location law to make every reasonable attempt to identify excavators within the area and to notify them annually of the law and services available.

D. The excavators are responsible to provide reasonable advance notice of their planned excavations, usually 48 hrs, to allow for the utilities to locate their facilities.

1.3 REQUESTING LOCATION SERVICES

A. The Operator shall call the "One Call Center" prior to any excavation

B. Every effort shall be made by the Operator to allow adequate time (48 hrs notice)

PROCEDURES
PIPE LOCATING / GENERAL

for other utilities to respond to line location requests.

C. The Operator shall make all reasonable effort to identify the presence of any buried structures including utilities prior to excavation.

D. The operator shall mark, using white paint, the area(s) of planned excavation prior to placing request for line location services.

E. When emergencies exist and the Operator does not have sufficient time to allow for 48 hr notice, every precaution shall be exercised to safely protect against damage to other utilities and substructures.

PROCEDURES
PIPE LOCATOR

2.0 PURPOSE

The purpose of this section is to establish appropriate and safe procedures for the location of Operator's existing buried facilities.

2.1 SCOPE

Covered in this section is the following

A. Location Methods

B. How to Use the Pipe Locator

C. Locator Operation

D. Locator Care

2.2 LOCATING METHODS

There are three primary methods for locating buried pipelines. These methods are:

A. Using map sheets, As-built drawings, and other appropriate records

B. Use of pipe locators.

C. Pot holing.

When locating pipelines from map sheets, measurements, etc., the pipeline should also be located with pipe locators, whenever possible. This is necessary to verify that the measurements taken from the drawings are accurate.

Pot holing buried pipelines is required whenever the pipeline cannot be located by methods A or B above.

2.3 PIPE LOCATOR

A. The pipe locator is an electronic instrument used for detecting and locating buried pipes, conduits and miscellaneous metal objects.

B. The instrument consists of two principal component parts:

- Directional, radio-type transmitter assembly
- Directional, radio-type receiver assembly

C. The function of the transmitter is to generate an electromagnetic field that surrounds the buried metal object or propagates along it in the case of a pipe. The instrument may be operated in either of two ways:

- <u>Inductive</u>: The electromagnetic field inductively coupled through the surrounding air and ground to the buried pipe, locator wire, or other metal object
- <u>Conductive:</u> coupling using a direct connection between the transmitter-induced electromagnetic field.

This determination of the principal direction(s) and strongest points of propagation of the electromagnetic field establishes the orientation and location of the pipe or other object.

The conductive mode is the most common and most reliable method to use and refers to the direct-wire connection between the transmitter-induced electromagnetic field.

In addition to locating pipelines, the pipe finder may be used to find the depth of a pipeline and to locate valves, pipe stubs, etc. It is however sound policy not to provide depths to contractors or other excavators.

2.4 <u>CARE OF LOCATORS</u>

A. The pipe locator is a precision instrument; treat it accordingly. The locator shall, when not in use, be stored in the padded storage box. Bouncing it about the body of the truck on rough streets may seriously damage the unit.

B. Keep the instrument dry.

C. Locators are equipped with battery testers and permit the testing of the batteries. This should be done each day to avoid failure of the instrument on the job. Spare batteries should be readily available.

D. Do not remove tubes or attempt field maintenance other than routine battery change. All maintenance and adjustments should be performed by qualified personnel.

E. Follow manufactures recommendations for routine maintenance.

2.5 METROTECH 810

A. Set-up / Test

1. Turn transmitter ON/OFF switch to ON position. Battery charge indicator lamps should flash.
2. The transmitter should be at least 50% charged. If not, replace battery
3. Fully extend receiver antenna.
4. Set receiver MODE SWITCH to battery test (second position) The needle on the Left/Right Guidance meter should move to the right of the line labeled BATT TEST. The farther the needle is to the right of this line the greater the charge.
5. If the needle is to the left of the line, the receiver batteries should be replaced
6. Move the receiver MODE SWITCH to AUX 9forth position)
7. Position receiver within 6" of transmitter. The digital signal should display 950 or above.
8. Turn receiver MODE SWITCH to line tracing mode (third position)
9. Move receiver back, 2 – 5 ft from the receiver
10. Point the receiver at the transmitter. The Left/Right Guidance needle will be centered on the meter and the tone silent.
11. Point the receiver left and right of transmitter. The needle should follow the change in direction.
    - Right - Solid arrow and continuous tone
    - Left – Broken arrow and broken tone
12. Center the needle, then press and release the DEPTH button. A depth reading should appear.

13 Push the transmitter POWER switch down to turn off

14 Test the conductive attachment for loose or broken wires.

B. Operation

Direct connection is the preferred method of locating because the locator transmitter is connected directly to the metallic conductor to be located.

1. With the transmitter OFF, plug the direct connect cable into the jack labeled DIRECT/4820 CLAMP
2. Attach RED lead to clean metallic part of the targeted conductor (object to be located)
3. Move transmitter away from conductor at right angle
4. Extend black lead (ground) as far away from transmitter as possible
5. Attach black ground lead to ground stake or to the MSA opposite side of insulator.
6. Pull power switch on
7. Trace the signal with the receiver
8. The pipe is located directly beneath the receiver where needle is centered and sound is null.
9. Appropriately mark the gas facilities per the conditions.

If direct connection is not possible, the locator may be operated using inductive coupling with a Metroclamp.

1. Transmitter OFF, plug Metroclamp into Direct/480 clamp jack
2. Place Metroclamp around the conductor to be located. Ensure that clamp jaws are completely closed
3. Follow steps as for direct connection to trace and mark gas facilities

If direct connection and Metroclamp methods are not possible, the locator may be operated using the Inductive Method

1. Place the transmitter over the conductor to be located at minimum of 30 ft from the area to be located
2. Pull the POWER switch on
3. Follow steps as for direct connection to trace and mark gas facilities

C. Properly store the locator in its case to ensure that it is protected for damage.

D. Refer to and follow the equipment manufacturers operating instructions

PROCEDURES
MARKING PIPELINE LOCATIONS

3.0 PURPOSE

It is the purpose of this section to provide minimum requirements and information in regard to marking gas pipeline locations..

3.1 SCOPE

Identify the following actions:

A. Mark with yellow paint, stakes, or other appropriate markings

B. Potential damage to facilities

3.2 LINE LOCATION

The operator shall mark its buried pipelines ahead of construction. Field markings indicate the approximate location of the gas piping are made with yellow paint, feather nails, stakes, or other appropriate markers, adjacent to the area to be excavated as follows:

A. In paved areas, a line approximately 18" long and 1" wide indicating the general direction and location of the pipe directly above the pipe or at a designated offset.

B. In areas of no paving, stake(s) painted yellow, or stake(s) with an approved yellow sticker, or with a feather nail driven into the earth either directly above the pipe or at a designated offset as shown on the stake(s).

C. The Operator will perform inspections of its facilities when damage to those facilities is suspected. This includes following natural occurrences such as earthquake, flooding, landslide or other.

D. When the locator determines that blasting is involved he shall notify the gas supervisor. If the blasting is to take place within 250 feet of the Operator's gas facilities, a leak survey of the facilities shall be scheduled for the area where the blasting, to take place before the blasting and again upon completion of the blasting to determine if any damage may have occurred.

PROCEDURES
MARKING PIPELINES

4.0 PURPOSE

The purpose of this section is to identify the safety requirements and appropriate procedures for marking gas pipelines in remote locations.

4.1 SCOPE

Pipeline markers are required to be placed:

A. As close as practical over pipelines in class 1 and 2 locations

B. Within reasonable line of sight

C. Public roads and railroad crossings

4.2 PIPELINE MARKERS

A. Line markers must be placed and maintained wherever necessary to identify the location of the distribution and transmission pipelines to reduce the possibility of damage or interference.

B. Line markers are not required for buried pipelines in Class Three and Class Four locations where placement of a marker is impractical, or where a program preventing interference with underground pipelines is in effect or where one should reasonably expect to find buried utilities.

C. Markers must be placed and maintained along each section of a main that is located **above ground** in an area accessible to the public.

4.3 PLACEMENT OF MARKERS

A. Locations and spacing for markers shall include, but are not limited to:
   1. Each crossing of a public road or railroad, spans, stream crossings, hilltops, major pipeline angle points, section lines (as necessary to mark pipeline location), etc.
   2. Spacing varies upon conditions, but normally is not greater than line-of-sight distances, particularly in overgrown rights-of-way.

B. Markers shall be placed so as to achieve the following:
1. They do not present any hazard to traffic.
2. They will be placed directly over the pipeline whenever possible.
3. Face in the direction of expected activity or traffic. If travel of traffic is from more than one direction, place signs as necessary. Where activity is unpredictable, signs and markers face in the longitudinal direction of the pipeline.

C. Pipeline markers should be checked as a normal course of business as part of the operator's continuing surveillance program.

4.2 <u>STANDARD MARKERS</u>

Markers for surface use shall incorporate:

A. The words, "CAUTION - GAS PIPELINE; BEFORE DIGGING, CALL,"

B. The name and address of the operating utility company

C. The local telephone number(s) to call in case of emergency, or for questions relative to the pipeline. The emergency number shall be available 24 hrs. per day

D. A toll free (800) number where appropriate

PROCEDURES
CATHODIC PROTECTION / GENERAL

1.0 PURPOSE (Part 192, Subpart I)

Corrosion is the tendency of metal to return to its natural state caused by a chemical reaction between the pipe and its surrounding elements.

It is the purpose of this section to provide the activities, methods and installation requirements necessary for corrosion control of the metallic gas piping system.

1.1 SCOPE

This section covers the following:

A. CP and CP Requirements

B. CP Inspections

C. Cathodic Protection System

D. Connection to pipe

E. Protective Coating

F. Pipe-to-Soil Potentials

G. Close Interval Survey

1.2 GENERAL

Corrosion of buried metal structures occurs where electrical currents flow from the pipe to the surrounding soil, in the case of submerged pipe to the surrounding body of water or in the case of above ground structures to the surrounding atmosphere. These currents cause molecules of the metal to disband from the pipe. This corrosion may eventually result in the loss of sufficient metal to weaken the pipe or pipeline facility causing adverse effects on the MAOP or even in the complete pipe penetration with a resulting gas leak.

Corrosion control is an essential component in the safe operation of gas pipeline and pipeline facilities containing steel and / or other metallic components. Adequate cathodic protection is an important component of maintaining pipeline integrity.

Two primary methods of Cathodic Protection (CP) shall be implemented.

1. Protective Coating: Coating applied to the pipe prior to installation, and maintained during the life of the pipeline facilities.
2. CP System: CP systems are an electrical means of mitigating corrosion on buried metallic structures, primarily steel; sacrificial anodes or impressed current. Each method employs galvanic anode cathodic protection; current is obtained from a metal of a higher energy level.

1.2 CORROSION

A. A corrosion cell consists of:
1. Anode
2. Cathode
3. Electrolyte
4. Electrical Connection

B. Causes of corrosion
1. Dissimilar metals
2. Dissimilar fabrication
3. Dissimilar soil environments
4. Dissimilar pipe ages
5. Dissimilar surface conditions
6. Stray DC ground voltage

1.3 GENERAL REQUIREMENTS

The purpose of cathodic protection is to force the entire metal surface to be cathodic to the environment. Metal piping shall be protected against the effects of corrosion.

A. Each piping system with separate CP systems shall be electrically separated (isolated) by the use of insulators.

B. Aboveground (exposed) piping shall be protected by the use of coating specifically designed for aboveground use (UV protective). Most commonly used is paint. This will place a barrier between the pipe and the outside elements (moisture).
- Aboveground piping shall be evaluated once every 3 years for atmospheric corrosion.

- Aboveground coatings should **not** be utilized for underground installations.

C. Underground (buried) piping shall be coated or wrapped and protected from the affects of rust and corrosion.

- Underground coating shall **not** be used on aboveground installations unless it contains ultraviolet inhibitors to prevent the deterioration of the coating when exposed to sunlight

D. Pipe-to-soil readings shall be taken on all underground piping once each calendar year not to exceed 15 months. Reading is measured with the use of a voltmeter and a reference half-cell (copper-copper sulfate cell).

E. CP readings shall be a minimum of – 0.85 volts (negative 850 millivolts) to demonstrate adequate cathodic protection for the underground pipeline facilities. Readings shall be taken at a sufficient number of locations and near the midpoints between anodes to assure that the steel piping is being adequately protected.

F. When a rectifier is in use, the rectifier shall be inspected 6 times each calendar year at intervals not to exceed 2 ½ months.

G. Whenever a portion of a buried metal pipeline is exposed, it shall be inspected for external corrosion and coating deterioration.

E. Whenever possible (pipe is cut, or tapping coupons), but less that twice each year, the interior surface of the pipe shall be inspected for the affects of internal corrosion.

F. C.P. records shall be maintained for as long as the pipeline remains in service.

PROCEDURES
PIPELINE FACILITIES INSPECTION

2.0 PURPOSE

Regular inspection of gas pipeline and pipeline facilities is an essential means of maintaining pipeline integrity.

The purpose of this section is to identify the inspection requirements and methods to be implemented.

2.1 EXTERNAL INSPECTION

A. Existing Facilities

1. Any time steel or other metallic pipe and or fittings are exposed and the protective coating is removed, inspection shall be conducted for signs of defects or damage. If the pipe coating is removed or the pipe is bare, a pipe to soil potential reading will be taken and recorded.
   a. Acceptable range, - 0.85 volts to - 2.85 volts
   b. **EXCEPTION:** When vacuum-extraction excavation method is used, opening only a small diameter excavation and the protective coating is not removed or damaged. Exceptions to recording a pipe to soil reading should be documented
2. Recorded pipe to soil readings for steel or other metallic pipe activity on the appropriate form, (Work and Repair Report)
3. Contractors are responsible for taking and documenting pipe to soil readings whenever exposing and removing protective coating from steel or other metallic pipe.
4. Gas Operator personnel are responsible for the review of pipe to soil data and initiating any appropriate remedial action in accordance with operator's procedures.
5. Pipe-to-Soil readings that fall outside of the acceptable range, -0.85 to -2.85, shall be immediately forwarded along with the appropriate documentation to the Gas Supervisor or designee to ensure prompt remedial action.
6. The condition found for the pipe, fitting, and/or coating shall be recorded on the appropriate form(s).

B. New or Replacement Installation

1. Prior to lowering coated steel pipe into the excavation, all pipe coating shall be visually inspected for defects.
2. All welds that are field wrapped shall be visually inspected prior to installation.

3. Electronic holiday inspection shall be preformed prior to initial installation of any steel pipeline.
4. All holidays in the coating shall be repaired and re-inspected prior to installation.
5. During inspection, ensure that the entire circumference of pipe has been checked.
6. The condition found for the pipe, fitting, and/or coating shall be recorded on the appropriate form(s).

C. Use only approved underground coatings for pipe to be buried, and approved above ground coating or paint (UV Protective) for pipe to be suspended or otherwise installed above ground.

2.2 INTERNAL INSPECTION

A. Any time steel pipe is removed from the system or the pipe is tapped and a coupon is captured, the interior surface of the pipe shall be examined and all information about the location and condition shall be recorded on the appropriate form. (twice each year whenever possible)

B. Coupons that do not show any signs of corrosion may be discarded only after the appropriate operator personnel have reviewed the facility and documentation.

C. Discarded coupons shall not be left in the trench.

D. Coupons exhibiting signs of corrosion shall be immediately forwarded along with the appropriate documentation to the Gas Supervisor or designee to ensure prompt remedial action.

2.3 ATMOSPHERIC CORROSION

A. The Operator will evaluate one third (1/3) of the system annually, and shall cover the entire system once every three years, inspecting for signs of atmospheric corrosion. This inspection shall include all above ground metallic facilities. (MSA's, suspended crossings, pressure reducing stations, etc.)

B. Signs of atmospheric corrosion include discolored and/or peeling paint, evidence of rust or oxidation of the metal surface, and any other condition that the operator believes may require remedial action.

C. If any evidence of atmospheric corrosion is identified, that portion of metallic pipe and/or appurtenance shall be thoroughly cleaned, and painted or coated with approved-for above the ground, ultra violet light resistant, paint or coating.

Note: Most paints and wraps work best within a defined temperature range. Follow manufacturer's directions for application.

D. Surveys, along with appropriate remedial action shall be documented.

E. Above ground facilities showing signs of heavy rust or pitting, shall be reported immediately along with the appropriate documentation to the Gas Supervisor or designee to ensure prompt remedial action. Repair or replace as soon as practical.

F. Use only approved for above ground, UV protective, coating or paint for pipe to be suspended or otherwise installed above ground.

G. The condition found for the pipe, fitting, and/or coating shall be recorded on the appropriate form(s).

PROCEDURES
ANODE / TEST STATION INSTALLATION

3.0 PURPOSE

The purpose of this section is to establish safe procedures for the installation of sacrificial anodes

3.1 SCOPE

This section covers proper procedures for the installation of:

A. Anodes Installation

B. Test Lead and Test Station Installation

C. Bonding

D. Braze / Silver Solder / Thermit Weld / Pin Weld

3.2 TYPICAL MAGNESIUM ANODE INSTALLATION

A. Installation with or without Cathodic Protection Test Station

B. Remove coating

C. Clean pipe with file and/or wire brush

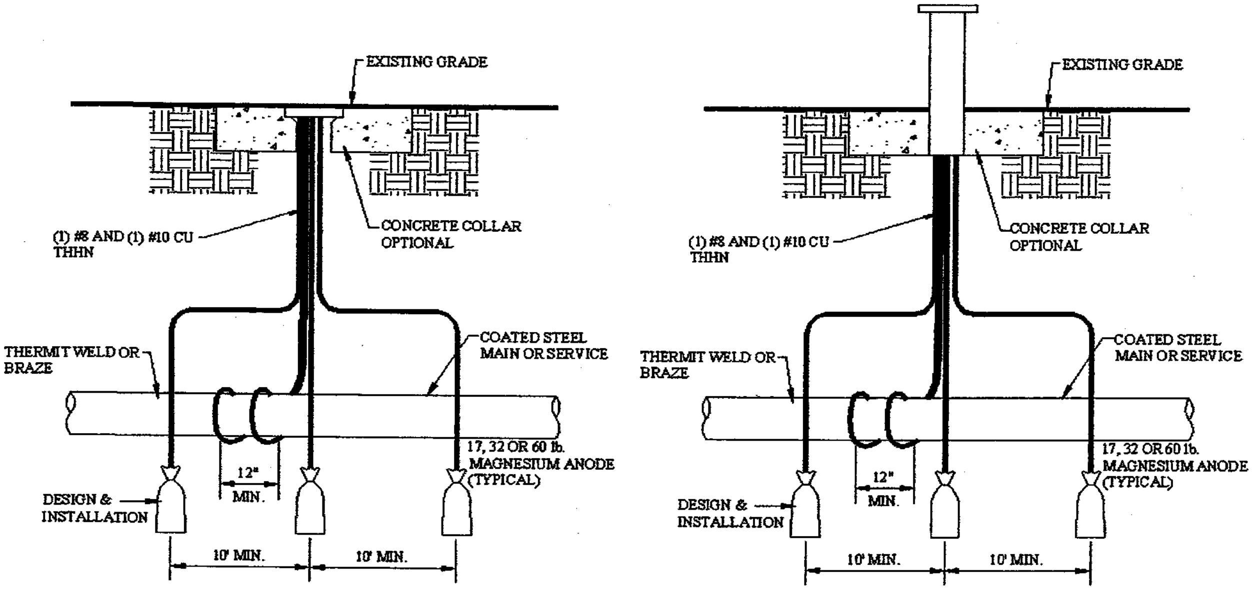
D. Strip insulation from wire

E. Install copper sleeve on wire (12 gauge or less)

F. Follow appropriate field wrap procedure when complete

PROCEDURES
ANODE / TEST STATION INSTALLATION

(Single or Multiple)

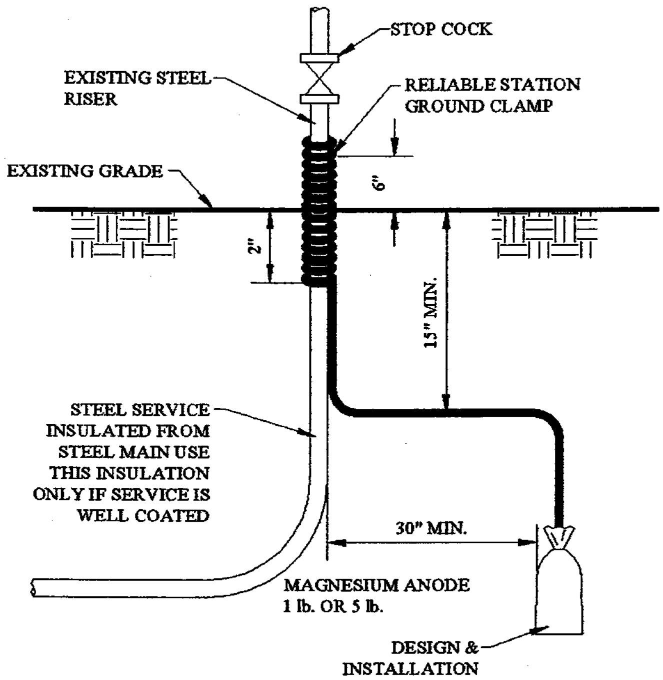


Procedure:

1. Look to place anodes in locations where soil is moist
2. Place anode(s) in upright position whenever possible
3. On newly installed or replacement pipe, anodes shall be installed at a minimum of 30" from the pipe (service riser), 5' to 10' (Mains) horizontally from the pipe
4. Install top of anode at not less than pipe depth
5. Do not lift or handle anode by its wire as this may damage its connection
6. If CP test station is used, all wires shall be terminated with sufficient slack (approximately 18")
7. Prior to placing anode, soak hole with water allowing sufficient time for absorption into soil.
8. When back filling anode, cover with native material, rock free. Carefully compact soil, and pour 5 gallons or more of water into the hole after anode is covered by 1 ft or more of native soil, then complete backfill per operator standard
9. If there is no permanent moisture in soil, install a means to water anodes (PVC pipe

PROCEDURES
ANODE / TEST STATION INSTALLATION

B. Service riser anode installation

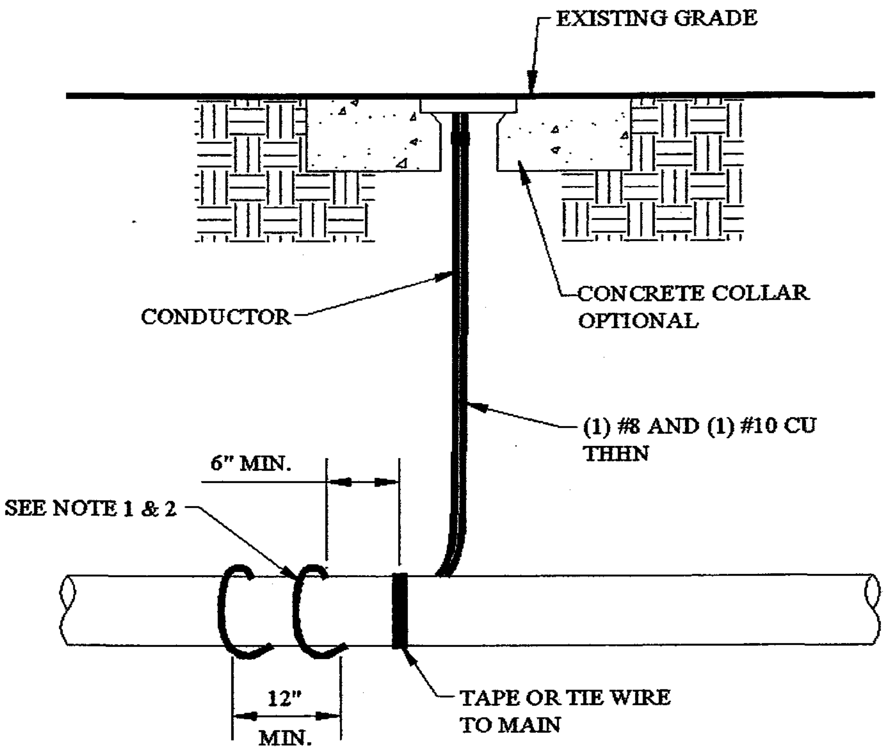


Procedure:

1. Clean a 1" section to bare metal around the entire circumference of the pipe 6" above ground level.
2. Install ground clamp on pipe at cleaned area (6" above ground level) and tighten set screw to secure clamp to pipe.
3. Install anode either vertically whenever possible
4. Install anode and wire a minimum of 15 inches below existing grade.
5. Do not lift or handle anode by its wire.
6. Install anode wire to clamp and tighten nut until wire is secure.
7. Coat clamp with one layer of rubber filler tape.
8. When back filling 1-5 lbs. anode, cover with approximately 6" of native material, rock-free. Carefully compact soil and pour about 5 gallons of water over and around anode and then complete backfill

PROCEDURES
ANODE / TEST STATION INSTALLATION

3.3 TYPICAL TEST STATION INSTALLATION

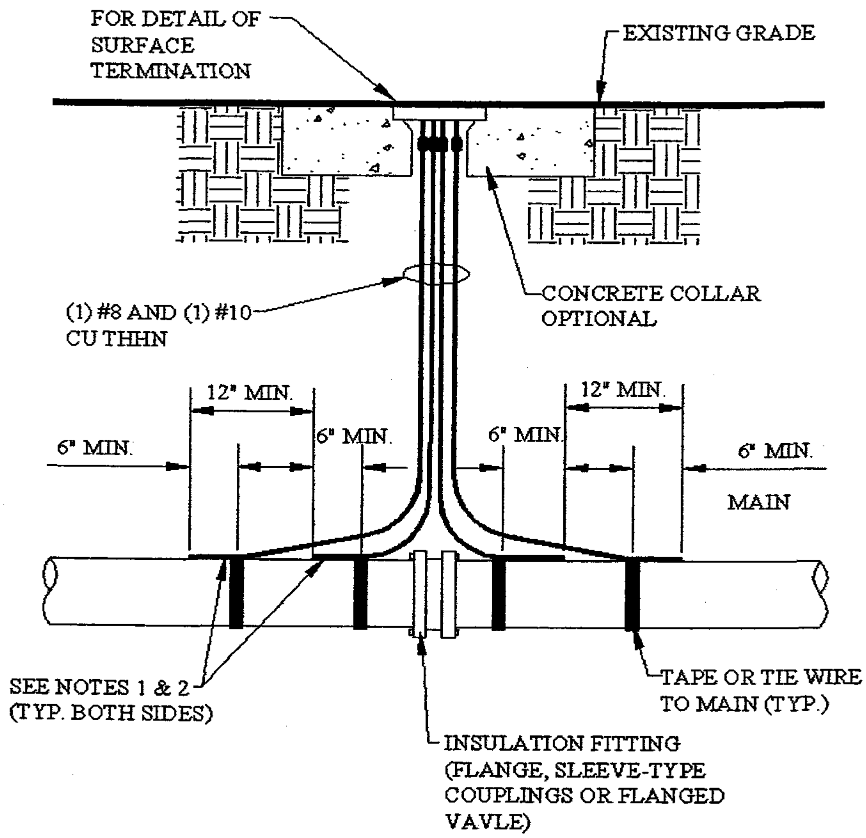


Procedure:

1. Attach wires and cables using thermit weld, silver solder, brazing or pin brazing
2. Wrap or coil wire around pipe (Minimum one time and twist) to prevent tugging/pulling from detaching the wire
3. Minimum distance between thermit weld or braze is 12"
4. Attach minimum of two wires to the main (one # 10 and one # 8)
5. Field coat main at points of wire attachment using approved primer and wrap
6. Wires should be long enough to extend a minimum of 18" above ground level if surface level test station and 18" above test station riser height if raised test station installation
7. Wires may be offset to any convenient location
8. Backfill per operator standard

PROCEDURES
ANODE / TEST STATION INSTALLATION

3.4 TYPICAL CONNECTION / BOND AT AN INSULATING FITTING



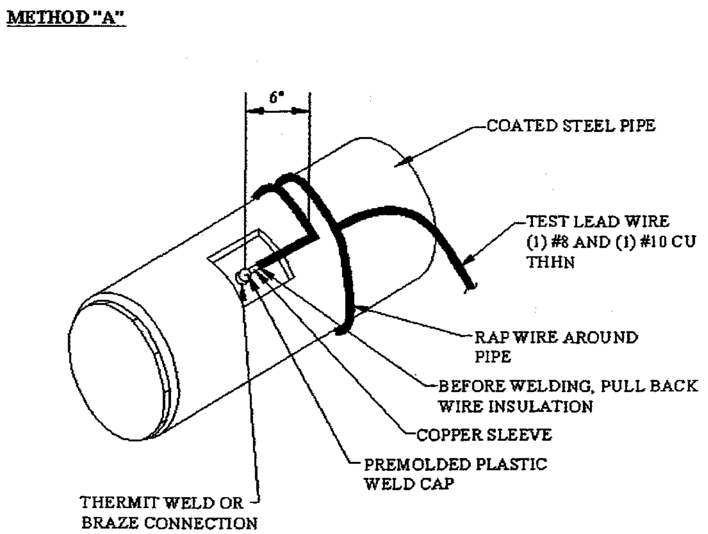
Procedure:

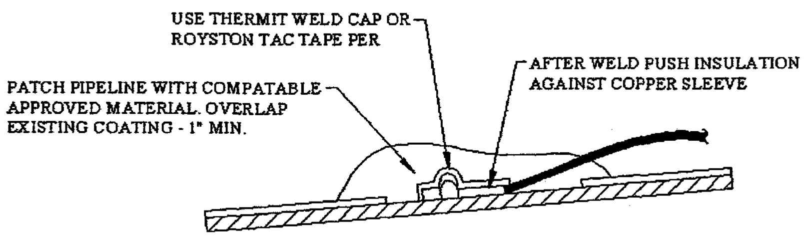
1. Attach wires and cables using thermit weld, silver solder, brazing or pin brazing
2. Wrap or coil wire around pipe (Minimum one time and Twist) to prevent tugging/pulling from detaching the wire
3. Minimum distance between thermit weld or braze is 12"
4. Attach minimum of two wires to the main on either side of the insulator (# 10 and # 8)
5. Wires should be long enough to extend at least 18" above ground level or top of test station riser
6. Field coat main at points of wire attachment using proper primer and wrap
7. Wires may be offset to any convenient location

PROCEDURES
ANODE / TEST STATION INSTALLATION

8. Do not attach wires to valves, fitting or components
9. Backfill to operator standard

3.5 BRAZE / SILVER SOLDER / THERMIT WELD / PIN BRAZE





Thirmit Weld:

1. Limited to pipe operating at less than 20% SMYS
2. The thermit weld cartridge shall not exceed a No. 15 charge (15 grams)
3. Limit to no. 8 and smaller diameter cables
4. Remove pipe coating and clean pipe surface of all foreign material
5. Strip wire insulation and install appropriate copper sleeve over wire; crimp lightly
6. The connection may be made on vertical or horizontal piping

PROCEDURES
ANODE / TEST STATION INSTALLATION

7. Make sure correct size weld mold is used for pipe size
8. Insert charge and ignite with appropriate spark igniter
9. Hold mold steady until ignition is complete, several seconds
10. Remove mold
11. Lightly tap connection to ensure good connection
12. Chip away excess material and jagged edges using a file to ensure smooth weld surface
13. Soap test
14. When connection is to be buried, the connection is to be adequately coated with rubber filler and plastic tape
15. Clean, dry and wrap pipe and connection. If tape is to be used, wrap tape completely around pipe.
16. Minimum of 12" between 2 or more welds
17. Do not attach wires to valves, fitting or components
18. Backfill to operator standard

Braze weld:

1. The Brazing process may not be used on steel pipe operating at greater than 20% SMYS
2. Remove coating and clean pipe (should be shinny metal)
3. Strip wire insulation and install appropriate copper sleeve over wire; crimp lightly
4. The connection may be made on vertical or horizontal piping
5. Use appropriate flux coated brazing rod
6. Preheat to dull red
7. Touch rod to heated pipe and allow flux to melt
8. Place wire on pipe
9. Continue to melt rod and flux on wire
10. Add sufficient rod to build a bead
11. Allow cooling time of 2 to 3 minutes
12. Lightly tap connection to ensure good connection
13. Soap test
14. Clean, dry and wrap pipe and connection
15. Do not attach wires to valves, fitting or components
16. Backfill to operator standard

Silver Solder:

1. The silver solder method has no limitations as to % SMYS
2. Remove coating and clean pipe (should be shinny metal)
3. Strip wire insulation and install appropriate copper sleeve over wire; crimp lightly
4. Apply thin coat of flux to pipe

5. Heat pipe, approximately 400^0 F prior to adding solder (use pyrometer of temp stick) **Do Not contaminate connection**
6. "Tin" pipe and wire
7. While pipe is hot, place wire on pipe
8. Melt sufficient puddle to attach wire
9. Neutralize flux with baking soda & water
10. Lightly tap connection
11. Clean, dry and wrap pipe and connection
12. Do not attach wires to valves, fitting or components
13. Backfill to operator standard

Pin Braze:

Application

1. The pin brazing method may be utilized with no limitations as to % SMYS or pressure due to its low temperature application

Preparation

1. Ensure that the batteries are fully charged
2. Wear appropriate personal protective equipment
3. Prepare pipe surface, remove pipe coating and clean pipe of all foreign material (should be shinny metal)
4. Caution should be exercised whenever using approved grinder on metal pipe surface to avoid removing any significant pipe wall thickness.
5. Light rain or snow will not adversely affect the pin braze however heavy rain or snow may cause the pin fuse to burn out prematurely resulting in faulty or no bond.
6. It is possible to pin braze in sub zero weather

Procedure

1. Maintain a minimum 12 inches separation from any weld or fitting on the pipeline
2. Attach magnetic earth lead to clean surface of pipe
3. Select appropriate brazing pin and ceramic ferrule (Keep stored in delivery tins and do not mix part numbers)
4. If using wire lug too pin braze wire directly to the pipe, strip wire insulation and install appropriate copper sleeve over wire; crimp lightly. Locate the brazing pin so the the pin is in the center of the hole.
5. Load the gun with brazing pin and ferrule ensuring that they are both back fully home and tight. (Do Not straighten the kinked end of the pin fuse wire)

PROCEDURES
ANODE / TEST STATION INSTALLATION

6. The legs of the pin holder must be adjusted as necessary to ensure a firm grip of the pin while maintaining concentricity with the ferrule holder
7. Apply sustained pressure on the brazing gun so that full contact is made
8. When ready to braze it is best to look away to one side
9. Hold the gun firmly and close the circuit by squeezing the trigger (Keep the trigger depressed until the braze is complete)
10. After approximately 2 seconds the fuse wire should rupture disconnecting the circuit. The arc will extinguish and the pin or stud will be shot forward into the molten filler (If this does not occur after the normal time (2 sec) the gun must be removed keeping the trigger depressed. Start the process over)
11. After the fuse has ruptured the gun must be held in place for an additional 3 seconds to allow braze to set.
12. When complete attach wire if necessary (using bolt style pin) and recoat/ rewrap pipe surface using approved coating procedure. **(Refer to Section L-6)**

Care and handling

1. Unit should be stored in dry room or cabinet with electrical supply and adequate ventilation
2. After each days use, examine battery to ensure that the electrolyte is 3/16" above plates. Top off with **distilled water** if necessary.
3. Check each battery cell with hydrometer. Specific gravity should be approximately 1.28. If less than 1.20 do not use and replace battery.
4. Replace cell tops and battery box door
5. Take care to not tilt equipment
6. Check battery connections for tightness and wipe clean and dry
7. Unit must be plugged in on charge whenever not in use.
8. Store brazing pins and ceramic ferrules in delivery tins and **do not** mix part numbers.

PROCEDURES
RECTIFIERS

4.0 PURPOSE

The purpose of this section is to identify appropriate procedures for installation and testing of impressed current cathodic protection systems, or rectifiers.

4.1 IMPRESSED CURRENT / RECTIFIER INSTALLATION

A. Impressed current / rectifier systems are designed and installed to provide cathodic protection for steel and other metallic gas piping systems.

B. The rectifier converts AC to DC power and is installed in conjunction with a groundbed of anodes in either a deep well or horizontal trench.

C. Impressed current / rectifier cathodic protection systems will be designed by the engineer for the specific situation.

4.2 RECTIFIER TESTING

Each cathodic protection rectifier must be inspected to ensure that it is operating properly. The following steps should be followed:

Rectifiers shall be tested six times each calendar year at intervals not exceeding two and one half months.

A. Check rectifier using appropriate tic tracer to ensure it is not shorted before beginning

B. Turn off power at the breaker

C. Feel each stack for temperature variations witch may indicate necessary replacement

D. Turn power back on

E. Read the direct current (DC) voltage and the DC amperage on the output of the rectifier. These reads can be measured using either the meter on the rectifier or an external meter.

F. Read both ON and OFF to verify proper meter operation.

G. Check for correct polarity

H. Adjust as necessary to achieve desired DC amp output

I. Measure the pipe-to-soil potential at structure and nearest test point

J. Read and record the kilowatt-hour meter, if one is present.

K. Note any repairs, replacement parts any necessary remedial action on appropriate form

L. Ensure rectifier is reconnected and working properly before leaving

4.3 INSTALLING CURRENT INTERRUPTER

A. Turn off the rectifier using the rectifier circuit breaker.
   1. Method A
      To install in the AC Circuit, disconnect the tap bar on the coarse side. Remember to note what setting the tap is connected to.
      a) Connect one side of the current interrupter to the coarse setting and the other connection to the tap bar center connection.
      b) Set the interrupter for the proper time you wish the interrupter to turn "on" and "off".
      c) Turn on the interrupter.
      d) Turn on the rectifier using the rectifier circuit breaker.
   2. Method B (alternate method)
      To install in the D.C. Circuit, disconnect the D.C. fuse or anode cable.
      a) Connect one lead wire of the current interrupter to the anode cable and the other connections to the positive rectifier terminal.
      b) Set the interrupter for the proper time you wish the interrupter to turn "on" and "off".
      c) Turn on the interrupter.
      d) Turn on the rectifier using the rectifier circuit breaker.

PROCEDURES
PIPE TO SOIL READINGS

5.0 PURPOSE

The purpose of this section is to establish the appropriate procedure associated with taking pipe to soil potential readings.

5.1 SCOPE

This section covers the following:

A. Appropriate pipe to soil readings

B. Testing copper-copper sulfite Half Cell

C. Appropriate method of taking pipe to soil readings

D. Remedial action

E. IR Drop / Millivolt Shift

5.2 PIPE TO SOIL READING

A. Pipe-to-Soils readings shall be taken anytime that buried or submerged pipe coating is exposed
   1. Coating is removed or damaged
   2. Not required when vacuum excavated

B. Adequate Cathodic Protection:
   1. The level of cathodic protection shall be considered adequate when the minimum pipe to soil potential is at least a **-0.85 volts (Negative 850 millivolts)** for metallic pipelines. This is the level at which metallic pipe no longer corrodes.
   2. A 100 milivolt shift is accomplished after the CP has been turned off (may require 2minutes to 24 hours)

C. Inadequate Cathodic Protection:
   1. Reading less than – 0.85 volts (more positive than) may indicate inadequate CP requiring <u>medial action</u> to correct the situation

D. To much Cathodic Protection:

PROCEDURES
PIPE TO SOIL READINGS

1. The amount of cathodic protection must be controlled so as not to damage the protective coating or the pipe. This is accomplished by limiting the maximum "on" pipe-to soil potential to **negative (-) 2.5 volts.**
2. Any reading greater than - 2.5 volts, indicates excessive CP requiring remedial action to correct the situation.

E. CP records shall be maintained for no less than 5 years. It is recommended that these CP records be maintained for the life of the pipeline.

5.3 TESTING HALF CELLS

Prior to taking any pipe to soils readings it is important to check or calibrate the reference electrodes being used. This can be undertaken as shown in Fig 1. The test is simply to place the porous plugs of a standard (unused) electrode and the field electrodes end to end and measure the millivolt difference. Generally, if the difference is less than 4 to 6 millivolts, no maintenance of the electrodes will be required.

Testing of the field reference electrodes should be undertaken each morning prior to the start of the survey. The millivolt difference and polarity between the working electrodes and the standard should be recorded.

TESTING REFERENCE ELECTRODES PRIOR TO FIELD USE

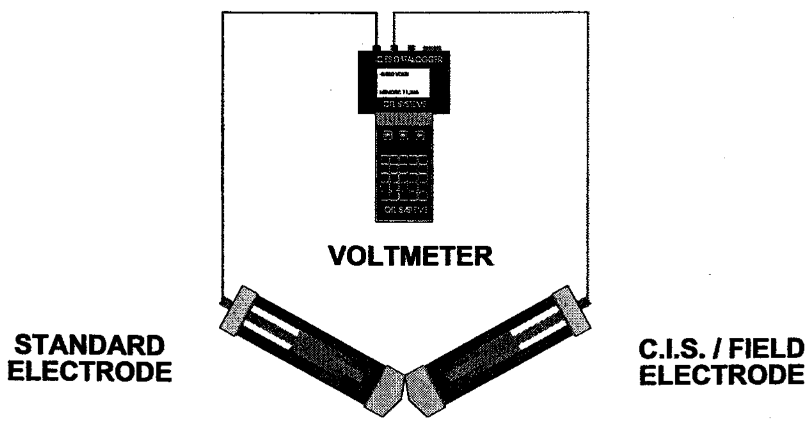


Fig 1

Note: The special calibrated reference electrode or standard reference electrode is not to be used in the field, except for the above test. Any Half-cell testing deficient shall be repaired or replaced.

5.4 PIPE TO SOIL PROCEDURE (STRUCTURE TO SOIL POTENTIAL)

A. Pipe to soil readings are taken utilizing a copper- copper sulfate half-cell and a voltmeter.

B. To ensure a proper pipe to soil potential reading, remove the cap and place the porous plug of the copper/copper sulfate reference electrode in firm contact with earth over the pipeline or close to it.

C. This may require "digging in" where the earth's surface is dry. In dry areas, it is necessary to moisten the earth around the electrode with fresh water to obtain good contact.

D. The red lead/wire from the digital voltage meter is connected to the structure/pipeline (via test point terminals or direct contact with pipeline); the black lead from the digital voltage meter is connected to the half cell; and the pipe to soil potential is read and recorded.

E. Some Half-cells utilize the volt meter attached directly to the top if the half-cell and require only on lead to be attached to the pipeline facilities or test lead to be tested.

F. The voltmeter must be of high input impedance to ensure accuracy.

PROCEDURES
PIPE TO SOIL READINGS

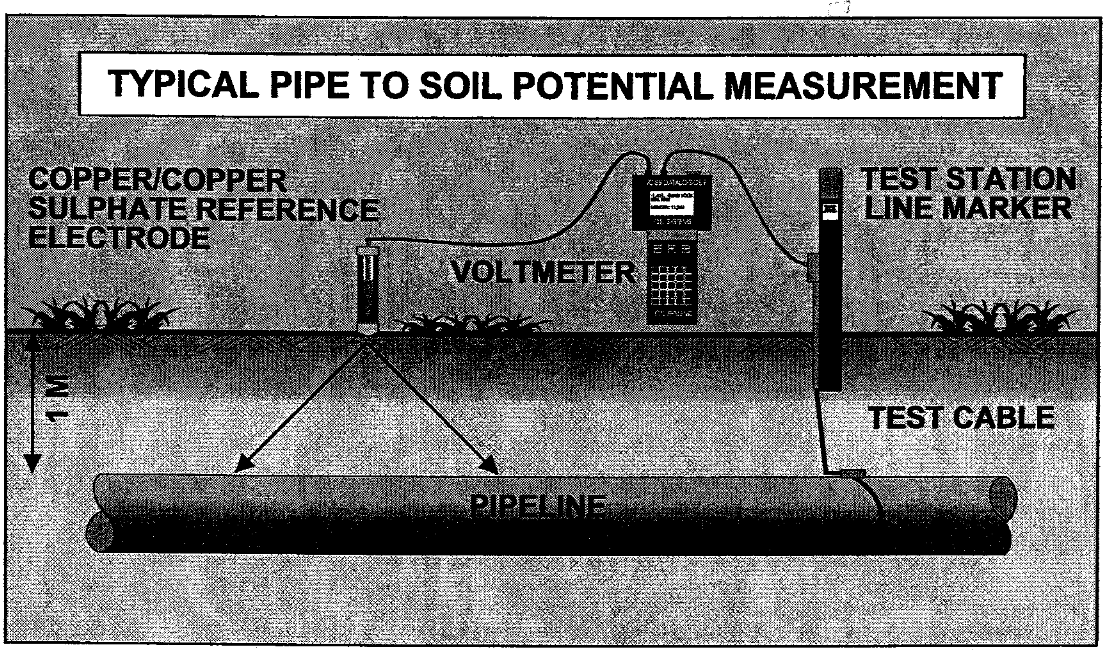


Fig 2

Shows the typical arrangement at a test station when a pipe to soil potential is being measured.

The positive terminal of the voltmeter is connected, by a test lead (red), to the pipeline through the test cable in the test station. The negative (black) lead is connected to the half cell. The pipe to soil potential will be displayed on the meter. The magnitude of this potential will depend on the Cathodic Protection system status, but may be in the range of -1000 mV to -1500 mV.

This potential represents the average potential of the pipeline at this location.

5.6 REMEDIAL ACTION

A cathodic voltage of a minimum of (-) 0.85 volts for steel pipelines with reference to a saturated copper-copper sulfate half-cell is the desired reading indicating an adequate level of cathodic protection.

A. If an area does not meet the above criteria, either a null survey using an appropriate faultfinder or Current Mapper or P/S survey shall be conducted to locate the shorted area within 90 working days after determination that the area does not meet the above criteria.

B. The repair of the area shall be started within 90 working days of the discovery of shorted services or underground contacts.

C. The same shall apply to long service areas where current is supplied by an anode or anode bank. Isolated short services or valves shall be repaired within 90 working days after discovery of noncompliance with the above criteria.

D. If a part has to be ordered, repairs shall be completed within 90 working days of receipt of repair materials or parts.

1. The voltmeter has 2 test leads. The red lead is positive and the black lead is common. The red lead is attached to the pipe or test lead, and the black lead is attached to the copper sulfate half cell (corrosion cell) for the purpose of taking CP readings. The voltmeter must be set to read Direct Current Volts.

2. Other uses include a meter designed for and attached directly to the half cell with <u>one lead.</u> This lead is attachment to the pipe or test lead for the purpose of taking CP readings.

5.7 <u>IR DROP</u>

A. IR DROP / IR ERROR

1. IR drop is a product of current and resistance. (Voltage drop) Voltage drop is negligible in the measuring circuit under the following conditions:
   - Metallic path lengths are short
   - Good contact between reference cell and electrolyte (moist soil)
   - Good connection points (clean metal to metal contact)
   - High-input impedance meter is used
   - Resistivity is low
2. All the voltage drops in the measuring circuit are controllable except for the drop across the electrolyte (surrounding soil or other medium). To reduce the IR drop:
   - Place the electrode near the structure coating holiday

- Or, interrupt the current flow
- Calculations can also be made to subtract the IR drop

3 When current is interrupted, the potential should be measured at "instant off" which refers to the potential after IR drop is eliminated but before polarization begins to dissipate.

5.8 MILLIVOLT SHIFT

A. 100 Millivolt Shift

1. The criterion is based on the difference between the two potentials, corrosion potential and polarized potential. (100 mV shift)
   - Momentarily interrupt the current flow to read the polarization potential
   - With the current remaining off, the polarization will dissipate, and polarization is the measurement of interest
   - When no further drop is recorded this is the depolarized potential.
   - If this is greater than 100mV difference, the pipe is protected regardless of the half cell reading.
   - The same is true in measuring the polarized potential after the current is reestablished and no further rise is recorded.

PROCEDURES
COATING / WRAPPING

6.0 PURPOSE

It is the purpose of this section to provide minimum requirements and information on the equipment, material and methods utilized for protective coatings and field wrapping of steel and other metallic pipe and fittings.

Each segment of metallic pipe, new or replacement shall have a protective coating.

6.1 SCOPE

This section covers the following:

A. Field Wrapping Steel Pipe

B. Shrink Sleeve

C. Protective Coating of Valves and Irregular Fittings

D. Painting

6.2 FIELD WRAPPING

The cleaning and application of plastic tape for use in the gas piping system is essential for corrosion protection.

The following products are acceptable for field-installed

A. For pipe and transition fittings, Royston 747 primer and tape, Polyken tape and primer, or equivalent products may be utilized

B. For weld joints the application, appropriate sized and thickness, of heat shrink sleeve may applied

C. For irregular shaped fittings and valves, Trenton Wax Tape and Wax Tape primer, grease wrap, or equivalent products may be utilized

Each product shall be applied in accordance with the manufacturer's instructions.

PROCEDURES
COATING / WRAPPING

6.3 PLASTIC TAPE METHOD

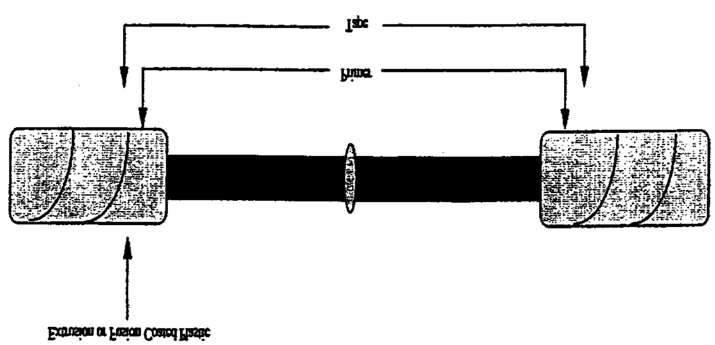
A. A holiday will be considered sufficiently cleaned if:
   1. All loose coating has been removed.
   2. The edges of shop coating are tapered.
   3. Exposed metal area has approximate diameter of not less than 1/2" on any size pipe.
   4. The exposed area and immediate surroundings shall be cleaned of dirt, loose coating loose rust.

B. All steel surfaces to which plastic tape is to be applied shall be clean and free of sharp points or foreign substances so that coating will adhere and not be damaged.

C. Primer must be thoroughly mixed before applying to steel surfaces.

D. Tape shall be applied to the primed surface when the primer is tacky to touch. The wrapping shall be in spiral with an overlap equal to 1/2 the width of the tape, extending 2" to 4" beyond bare metal or within 1" of a stopcock on a riser.

The following figures give the requirements for wrapping joints, damaged factory wrap, bends or prefab risers.



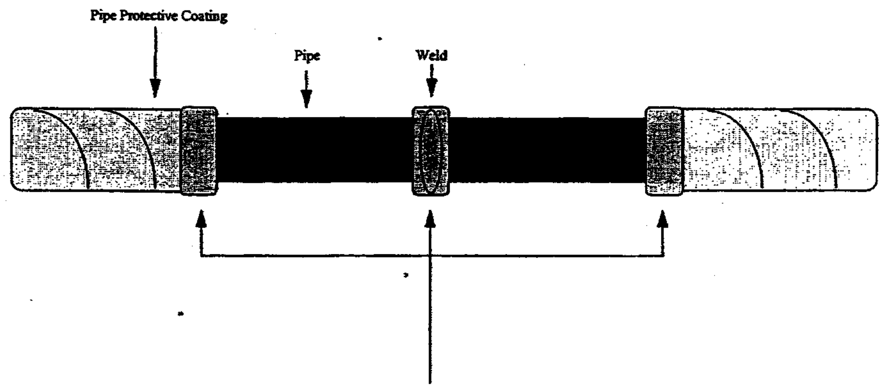
Extrusion and Fusion-Type Coatings

FIGURE 1

PROCEDURES
COATING / WRAPPING

NOTE: When field wrapping a transition to PE, neither primer nor tape should be applied within ¼" of the PE. Electrical tape should be applied to the remainder of the fitting. All transition fittings after welding will have the entire steel portion wrapped.

FIGURE 2



Wrap tape on end of pipe coating and on weld, making at least 1 1/4 turns, keeping tape under tension, and then 1/2 turn with no tension on tape. This coating of tape will minimize effect of rough edges.

PROCEDURES
COATING / WRAPPING

FIGURE 3

Installation on Damaged Factory Wrap

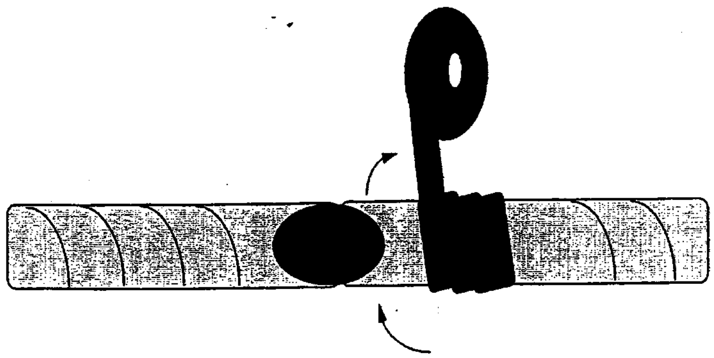
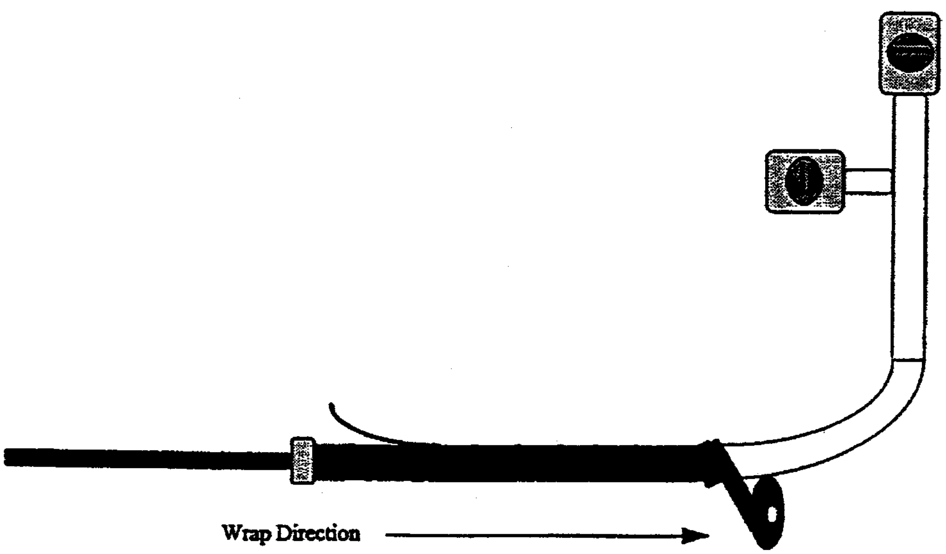


FIGURE 4

Installation on Shopbuilt Rise or Bends



6.4 VALVES AND OTHER IRREGULAR SHAPED FITTINGS

A. Wax Tape
1. Prepare surface to be coated by cleaning with wire brush and wiping clean so that it is free from loose coating, rust, scale and other foreign matter. Surface should be wiped as dry as possible.
2. Apply wax tape primer to surface by brush or hand (gloved). Only a thin film of primer is necessary and no cure time is required
3. If fill putty is necessary, apply directly by hand working the putty material onto the metal surface insuring that the putty is "wetting" and adhering to the surface. Apply the putty material in and around the voids contours and crevices to build up an even surface
4. Apply Trenton #1 Wax Wrap, or other engineers approved equal material, allowing for at least a 1" overlap. The wax wrap should overlap at 3" to 6" over any existing coating
5. Visually inspect tape application for deficiencies such as overlap voids and air pockets. If present, correct by manually smoothing out seams and air pockets
6. Backfill may take place immediately after application. No drying or cure time is required.

B. Grease Wrap
1. Prepare surface to be coated by cleaning with wire brush and wiping clean so that it is free from loose coating, rust, scale and other foreign matter. Surface should be wiped as dry as possible.
2. Coat pipe and fitting with grease
3. Apply glass mat wrap around entire surface coated with grease
4. Apply second coat of grease
5. Apply plastic wrap over greased area
6. Use sufficient electrical tape to secure plastic wrap

6.5 PAINTING

A. Store paint in cool dry place in manufactures container only

B. Do Not use after expiration date

C. Prepare surface by removing excess rust, scale, dirt, oil soap and other contaminants

D. Use 120 grit sandpaper and/or wire brush

E. Clean and dry

F. Primer and Paint Application
1. Touch up factory paint only (Do Not paint entire surface)
2. Paint bare metal and rusted areas
3. Apply two layers of primer ensuring each is dry / tack free
4. Apply two layers of approved paint
5. Finish coat should be uniform
6. Prevent overspray
7. Do not paint index glass, gauges, instruments, etc…

G. When painting in enclosed spaces always check and eliminate possible ignition sources, leave doors and windows open and ensure adequate ventilation.

PROCEDURES
C. P. MONITORING

7.0 PURPOSE

The purpose of this section is to establish procedures for the monitoring necessary to maintain appropriate cathodic protection (CP) levels on existing pipelines as an integral component of maintaining pipeline integrity.

7.1 SCOPE

The following surveys requirements are covered:

A. Pipe Coating Inspection
B. Atmospheric Corrosion Inspection
C. CP Surveys
D. Close Interval Survey
E. Isolated Steel Section Survey
F. Null / Short Survey
G. Stray Current / Bonding / Insulating / Electrical Isolation

7.2 PIPE COATING INSPECTION

A. Each time a buried or submerged pipe or pipeline facility is exposed the coating shall be visually inspected for:
   1. Deterioration and/or damage
   2. Cracking and/or disbondment
   3. Signs of external corrosion
   4. Document findings on appropriate form(s)
   5. Issue any appropriate work order(s)

B. Each time the pie coating is removed or missing:
   1. A pipe-to-soils reading shall be taken
   2. Check for signs of external corrosion
   3. Perform remedial action as may be necessary including utilizing a holiday detector
   4. Re-wrap the section of pipe using appropriate procedure
   5. Document findings and actions on appropriate form(s)
   6. Issue any appropriate work order(s)

7.3 ATMOSPHERIC CORROSION INSPECTION

A. A survey for the signs of atmospheric corrosion shall be conducted once every three years.

B Atmospheric corrosion of iron/steel facilities may appear on above ground facilities in the form of:
1. Flaking or bubbling paint
2. Metal loss with rust
3. Scaling of the pipe
4. Pitting of the pipe

C. Atmospheric corrosion of aluminum facilities, meters and regulators, may appear on the surface as a build up of a grayish powdery substance

D. Perform appropriate remedial action(s) as necessary

E. Document findings and actions on appropriate form(s)

7.4 CATHODIC PROTECTION (CP) SURVEY

A. An annual (once each calendar year not exceeding 15 months) survey involving pipe to soil readings of each test station or otherwise identified location within the gas piping system shall be undertaken.

B. Documentation of the annual survey records shall be maintained for a minimum of 10-years.

C. Each reverse current switch, diode, and interference bond shall be inspected six times each year at intervals not exceeding two and one half months.

D. Readings outside of the acceptable range or other abnormal operating conditions shall be forwarded immediately to the gas supervisor or designee.

7.5 CLOSE INTERVAL SURVEY (C.I.S.)

A. CIS is an accepted method of indirect assessment. CIS is most often conducted on transmission facilities located in High Consequence Areas (HCA).

B When required, a close interval C.P. survey of the gas system shall be conducted. This involves pipe to soil readings taken at close intervals (every 1 to 3 meters) for the entire length of the pipeline.

A connection is made to the pipe test lead in a test station, and the reference electrode is moved down the line as shown in *Fig 1*, the pipe to soil potential can be measured

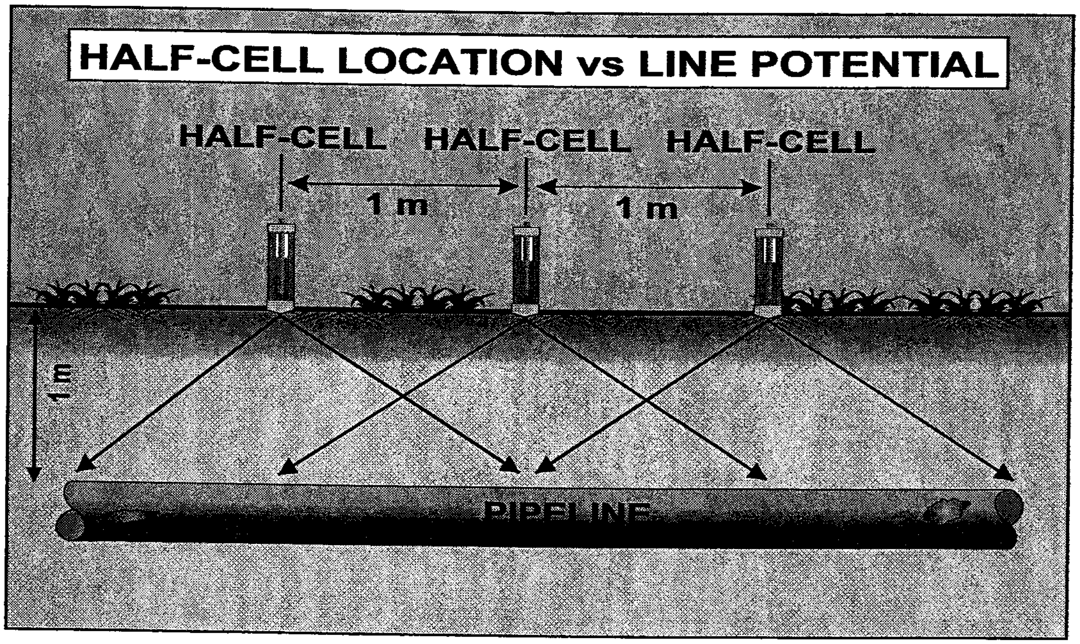


Fig 1

at numerous sequential locations. This is the basis of the C.I.S. The reference electrode spacing is usually either 1 m or 3 m, and by taking pipe to soil potential measurements over a fixed distance, a graph plot of potential vs. distance can be produced.

In cases where direct current is flowing, the pipe to soil potential that is measured, will include the actual pipe to soil potential, the voltage gradient in the ground, the voltage drop across the coating and the voltage drop **(IR Drop)** in the pipeline.

In this case, the pipe to soil potential is not the true pipeline potential. If the true pipe to soil potential is to be measured, the direct current flow causing the voltage gradients and pipe **IR**

Drop must be removed.

This can be accomplished by temporary interruption of the Cathodic Protection rectifier current outputs, which will remove the direct current flowing in the system.

Therefore, there are two pipe-to-soil potentials that may be measured and recorded at each location when direct current flow in the ground is a factor.

The potential recorded with current flowing is called the "on" potential, and the potential recorded while the current flow is interrupted, is called the "off" or "polarized off" potential. Some surveys require both "on" and "off" potentials to be recorded. Other types of survey, e.g. on sacrificial anode systems, require only "on" potentials. Note that in sacrificial anode systems, the magnitude of current flow is generally less than for rectifier systems, and the current flow is more localized due to anode distribution.

7.6 ISOLATED STEEL SECTION SURVEY

A. An isolated steel section is a section of gas pipe not in excess of 100 linear feet in total length that is in some way isolated from other metallic piping and / or from the CP system.

B. Monitoring and testing of the level of CP shall be conducted testing a minimum of 10% per each calendar year and a different segment(s) tested each year so that the entire system is tested over a ten year period.

C. Pipe to soil readings shall be taken at each location and the readings recorded.

D. Documentation shall be maintained for a minimum of ten years.

E. Be aware of the potential that the locator wire may be attached affecting the pipe-to-soil readings. If in the judgment of the technician, a problem may exist, remedial action would be warranted and should be documented.

7.7 NULL / SHORT SURVEY

Null surveys are conducted to determine where shorts may exist along the Operator's pipeline facilities. Shorts or loss of CP protection from the facilities of the Operator to other facilities including underground and / or aboveground facilities other utilities and /

or privately owned or customer facilities.

1. A null survey is conducted using a Tinker Razor fault finder, or approved pipe locator
2. Connect fault finder in accordance with manufacturer's directions. (Refer to Section K-2)
3. Refer to system maps and follow pipe accordingly. Watch for indications that the pipe is not following the path indicated on the system maps
4. Note where indications exist that the pipe is possibly shorted
5. Take pipe to soil reading that may further indicate that a short exists at the suspected location
6. Take corrective action to eliminate all shorts
   a. Dig up and isolate buried shorts
   b. Repair or replace, or install insulators where necessary
   c. Disconnect attached locator wire if a problem
7. Record all findings an necessary remedial action

The following surveys requirements are covered:

7.8 <u>STRAY CURRENTS</u>

A. Stray AC and or DC electrical current may adversely affect the Operator's Cathodic Protection. Current will stray from one source to another along the path of least resistance. Samples of stray current sources may include:
   1. Other cathodicly protected structures
   2. Electric lines
   3. Railroads or electric rail transportation systems

B. Means of managing stray currents include:
   1. Insulating, installing insulated fittings at connection points such as meters and taps to prevent the flow of current from one structure to another.
   2. Bonding, from one source of current to another to create a path for the current to flow without damaging one or the other structure.
   3. Electrical isolation, of one structure from another where a short may exist.

PROCEDURES
TAPPING AND LINE STOP / STEEL

1.0 PURPOSE
(192.627)

The purpose of this section is to provide minimum requirements and information regarding steel pipe tapping and line stop operations.

1.1 SCOPE

A. Equipment
B. Fittings
C. Tapping
D. Stopping
E. Completion

1.2 EQUIPMENT AND FITTING

A. The proper fitting and pressure rating shall be verified before fitting is installed on the pipeline. Only fittings that meet or exceed the MAOP of the pipeline shall be utilized. Only approved fittings and line stop equipment shall be used.

B. The pressure rating for the line stop equipment shall be verified to meet or exceed the working pressure of the pipeline before the tapping procedure begins. Exceeding the rated pressure may result in serious injury.

C. Only those fittings designed for a specific manufacturer of line stop equipment should be used with that equipment.

D. "O" rings and gasket materials should be maintained in good working order at all times. Damaged "O" rings or gasket materials shall be discarded and replaced. Lubricate "O" rings as required. Pipe thread sealant should be used to create a pressure seal on threaded connections that do not require an "O" ring or gasket.

E. Use only the manufacturers stopper lubricant on rubber stoppers or on the rubber seal of steel wedge stoppers when required per manufacturers operating manual. Do not use any other lubricant or cleaner.

F. At no time shall fittings or equipment be used for anything other than its designed use.

G. Repair of equipment shall be performed only by individuals knowledgeable of their operation and repair and using only factory supplied parts and equipment. At no time shall equipment be repaired or re-manufactured in any way other than their intended design.

H. Line Stop equipment shall not be subjected to welding, cutting, drilling, honing or any other type of action that would decrease its operability or designed pressure rating.

I. The operator shall follow the manufacturers procedures for tapping and completion of Line Stop fittings.

J. Do not use line stop equipment that is broken, damaged, missing parts or in the opinion of qualified personnel is in need of repair.

K. In gaseous atmospheres, ground cables shall be used in order to avoid static electricity.

1.3 TAPPING

A. Each tap made on a pipeline under pressure shall be performed by individuals qualified to make Hot Taps.

B. Verify that the fitting to be used and that the tapping, stopping and completion equipment is the correct type, size and pressure rating for the work to be performed and that the equipment is in good working order.

C. Install and pressure test the fitting before tapping. Select and install the correct valve and adapters as necessary.

Note: Insert and remove the completion plug using the completion equipment at this time, to verify proper alignment and operation of the equipment and completion plug.

D. Verify that the correct type and size of shell cutter and adapters are installed in the tapping machine. Also verify that the detents or coupon retaining device is in good working order.

E. When tapping steel pipelines, lubricate the shell cutter with the proper cutter lubricant. Apply cutter lubricant to the pilot drill tip and to the shell cutter teeth with care. To much lubricant can interfere with the normal operation of the tapping equipment and if used in excess, can restrict the flow of gas through the pipeline during the tapping procedure.

F. Measure and mark the correct tapping distance for the type of fitting being used and the diameter of the pipeline.

G. Verify travel distance of the tapping machine.

H. Install the tapping equipment and the complete the tap per the manufacturers operating manual.

1.4 STOPPING

A. Verify that the correct type and size of stopper is installed in the stopping equipment.

B. Verify that the stopper is installed correctly in the stopping equipment.

C. Do not use stoppers that are badly cut, ripped or damaged.

D. Lubricate the stopper using the manufacturers recommended stopper lube when applicable.

E. Verify, by measurement, stopper travel.

F. Install the stopping equipment and complete the stopping procedure per the manufacturers operating manual. Use only enough pressure as may be required to shut off the gas flow. Over tightening the stopper could damage the equipment and result in an unsafe condition.

G. Upon completion of the stop-off, purge remaining gas from the pipeline and complete required work.

Note: During welding operations, do not allow the stopper to become overheated. By applying wet rags at the base of the stopper fitting and maintaining them will reduce the amount of heat transferred to the

stopper.

H. Upon completion of the required work, lift the stopper and remove it.

Note: **In order to prevent damage to the stopper, the unpressurized section may need to be equalized before the stopper is removed. This can be accomplished by installing a fitting on the unpressurized section and by-passing gas from the pressurized side to the unpressurized side.**

1.5 COMPLETION

A. Select the proper type and size of completion equipment and verify that the completion tool is in good working condition.

B. Verify that the completion plug is installed in the completion tool correctly.

C. If the completion plug is equipped with an "O" ring, ensure that it is in good working condition and lube the "O" ring.

D. Install the completion plug to the required depth, verified by measurement (when applicable). Count the turns required to ensure complete shut off, when necessary.

Note: **It is necessary to perform the alignment procedure prior to tapping the fitting in order to ensure that the completion plug can be successfully installed.**

E. Once the completion plug has been installed, soap test for leakage.

F. Install the completion cap per manufacturers procedure.

PROCEDURES
TAPPING / PLASTIC

2.0 PURPOSE
(192.627)
The purpose of this section is to provide minimum requirements and information regarding steel pipe tapping and stopping

2.1 SCOPE

Tapping tees must be protected from shear and bending loads. Protection is provided by properly installed, compacted embedment preferable in combination with a protective sleeve installed over the tap tee connection with the service line.

WARNING: Gas leakage (blow-by). When tapping a pressurized main, gas can leak past the cutter when the cutter is retracted from the pipe wall. Take all necessary personal safety precautions. Do not remove the cutter.

2.2 TAPPING

1. Each tap made on a pipeline under pressure shall be performed by individuals qualified to make Hot Taps.

2. Prior to tapping the main, the service line should be fused to the tapping tee in accordance with the manufacturers procedures. Before fusing the service line to the tapping tee, slide the protective sleeve (sized to fit the tapping tee outlet) over the free end of the service line. Then fuse the service line to the tapping tee outlet and fuse the opposite end of the service line to the meter riser or service connection in accordance with the manufacturers procedures.

3. Pressure test all fusions in accordance with **Section H-3**.

4. Saddle fusions must be completely cooled before tapping the main.

5. Remove and inspect the cap, and o-ring, place tapping tee wrench in hex opening of cutter at top of tee. Turn wrench clockwise until the fixed stop of the wrench makes contact with the tower top of the tapping tee-this will make the tap. The section cut from the pipe wall (coupon) will remain in the cutter.

6. Turn wrench counterclockwise until top of cutter is even with the top of tapping tee tower. Remove the wrench.

7. Install the tapping tee cap.

   a. Check to be sure the o-ring is in place at the top of the body, and the threads and sealing surfaces are free of dirt and contaminants.
   b. Place the cap on the body and turn counter-clockwise until the leading edges of the threads clear each other and the cap drops onto the second thread. With a marker such as a felt tip pen, mark the top of the cap in line with the service outlet.
   c. For the standard tapping tee, screw the cap clockwise 12 to 12-1/2 turns. An additional 1/4 to 1/2 turn is permissible if necessary; however, tightening beyond 13 turns may over tighten and damage the o-ring seal. Do not use a wrench or any other means to tighten the cap.

8. Soap test fitting and cap to ensure no leakage is present before completion and backfill.

9. Slide protective sleeve over outlet end of the tapping tee and secure with plastic tape to avoid slippage of sleeve during backfill operation.

PROCEDURES
QUALIFICATION TESTING / GENERAL

1.0 PURPOSE

It is the purpose of this section to provide the requirements and procedures for qualifying operator and contractor personnel in the joining of various pipe materials. This section is separate from the Operator Qualification Written Plan.

1.1 SCOPE

This section covers the following:

A. Qualification test for plastic pipe and fittings.

B. Qualification test for SMAW and GMAW welding of pipe and fittings

1.2 GENERAL

A. Initial qualification of all personnel who will join plastic pipe or weld within the Operator's system should be conducted by a **Qualified Third Party.**

B. Re-qualification of operator and contractor personnel may be conducted by qualified operator personnel who, are qualified by training and/or experience, or have been qualified by a qualified third party.

C. Contract Inspectors who are qualified by training and/or experience may re-qualify contractor personnel.

Note: Initial testing requirements will apply to all individuals who are qualifying for the first time, or for any individual whose qualification has lapsed, (become invalid).

1.3 PLASTIC PIPE JOINERS

A. All personnel qualified in plastic pipe joining procedures will be given an annual requalification test. (Time not to exceed 12 months)

B. All tests shall be documented on the appropriate form and maintained in accordance with the Operator's procedures. (It is recommended that records be maintained for a minimum of five years) All test coupons shall be inspected and evaluated by a qualified individual.

C. Operator plastic pipe joiners who fail their pipe joining requalification test may retest within two weeks after failing the test. If the retest is failed, the pipe joiner should be bared from joining for a minimum period of six months.

D. Contract plastic pipe joiners who fail their pipe joining requalification test may be retest within two weeks after failing the test. If the pipe joiner fails the retest, the pipe joiner shall then wait a minimum of six months before being given another pipe joining test.

E. The pipe joiner may work in a classification, which does not have the requirement for that particular pipe joining process.

F. Qualification after six months should be conducted by a qualified third party and should be conducted as if being an initial test.

G. A pipe joiner shall be required to re-qualify if production work does not appear satisfactory:

H. The supervisor shall pull the qualification card of any pipe joiner whose work does not appear satisfactory.

1.4 <u>WELDERS</u>

A. Operator welders who fail their re-qualification test may be retested within two weeks after failing the test. If the retest is failed, the pipe joiner should be bared from welding for a minimum period of six months.

B. Contract welders who fail their requalification test may be retested within two weeks after failing the test. If the retest is failed, the pipe joiner should be bared from welding for a minimum period of six months

C. The contract welder may work in a classification, which does not have the requirement for that particular welding process.

D. Qualification after six months should be conducted by a qualified third party and should be conducted as if being an initial test.

E. No welder may weld with a particular welding procedure unless, within the preceding six calendar months, that welder has been qualified in welding that procedure.

PROCEDURES
QUALIFICATION TESTING / POLYETHYLENE

2.0 PURPOSE

This section establishes the specific requirements and procedures by which personnel will be deemed qualified to join polyethylene pipe, tubing and fittings by the heat fusion and mechanical methods. All criteria for initial qualification and annual re-qualification are outlined in this section.

Preliminary training shall be provided for each person attempting to qualify in joining polyethylene pipe and tubing.

Each person attempting to qualify should understand all of the procedures for joining polyethylene pipe, tubing and fittings prior to qualification testing.

2.1 SCOPE

A. Initial test

B. Requalification testing

2.2 INITIAL TEST REQUIREMENTS

A. The qualification test shall consist of:

1. 2" and 8" Butt Fusion
2. 2" Socket Fusion
3. 2" X 1" Saddle Fusion
4. 2" Electrofusion Coupling (only for those persons who need to be qualified in electrofusion).
5. 2" Electrofusion Split Repair Saddle (only for those persons who need to be qualified in electrofusion).

B. The initial qualification shall be conducted by a **Qualified Third Party**. The individual conducting the tests shall:

1. Observe the construction of the fusion test assembly.

2. Evaluate the fusion heating times, safety practices, and use and care of tools.

PROCEDURES
QUALIFICATION TESTING / POLYETHYLENE

3. Check for the double rollback bead in the butt joint. Inspect the joint for a uniform, nonporous, well-aligned bead around its entire circumference.

4. Observe that all aspects of the procedures are adhered to during the qualification test.

C. After joints have cooled to ambient temperature butt fusion and electrofusion joints shall be subjected to a **bend test**. Cut joints into at least 4 longitudinal sections 1" wide and 9" long. One section shall be taken from each quadrant. these sections shall be subjected to 2 root bends and 2 face bends, (4 face bends for electrofusion) Fusions shall be subject to destructive testing as recommended by PLEXCO bulletin #105.

D. Rejection Criteria

The following constitutes the criteria that will result in disqualification of a person to make heat fusion joints with polyethylene:

1. Any defect in the bead. This includes non-fusion, porosity, incomplete rollback, failure of the bend test, etc.

2. Any indication of fusion brittleness.

3. Failure to perform the fusion per qualified joining procedures.

2.3 ANNUAL REQUALIFICATIONS

A. The requalification test shall consist of one 2" socket fusion, one 2" and one 8" butt fusion.

B. Annual re-qualification on electrofusion (only for those persons who need to be qualified in these processes as per supervisors) shall be the same as the initial qualification:

Electrofusion - 2" coupling
- 2" Electrofusion Split Repair Saddle.

PROCEDURES
QUALIFICATION TESTING / WELDING

3.0 PURPOSE

This section establishes the minimum requirements for qualification in shield metal arc welding (SMAW) procedures by which personnel will be deemed qualified to weld with these electric arc processes.

3.1 SCOPE

A. Before starting the qualification test, the welder shall be allowed a reasonable time to adjust the welding equipment for the test.

B. The welder shall use the same welding technique and proceed with the same speed that he will use if he passes the test and is permitted to do production welding.

3.2 INITIAL TEST REQUIREMENTS

A. Initial testing should be conducted by a **Qualified Third Party**

B. The qualified representative conducting the test shall visually inspect the process to ensure that the welder follows the qualified welding procedure. (API 1104 will be used in the standard.)

C. Operator welders shall initially qualify for arc welding under API 1104, Standard on pipe having a diameter of 6.625" and wall thickness of .250".

3.3 REQUALIFICATION

A. Biannual tests are required for all electric arc welders. Test shall be at intervals not to exceed six months from the last date of qualification or requalification.

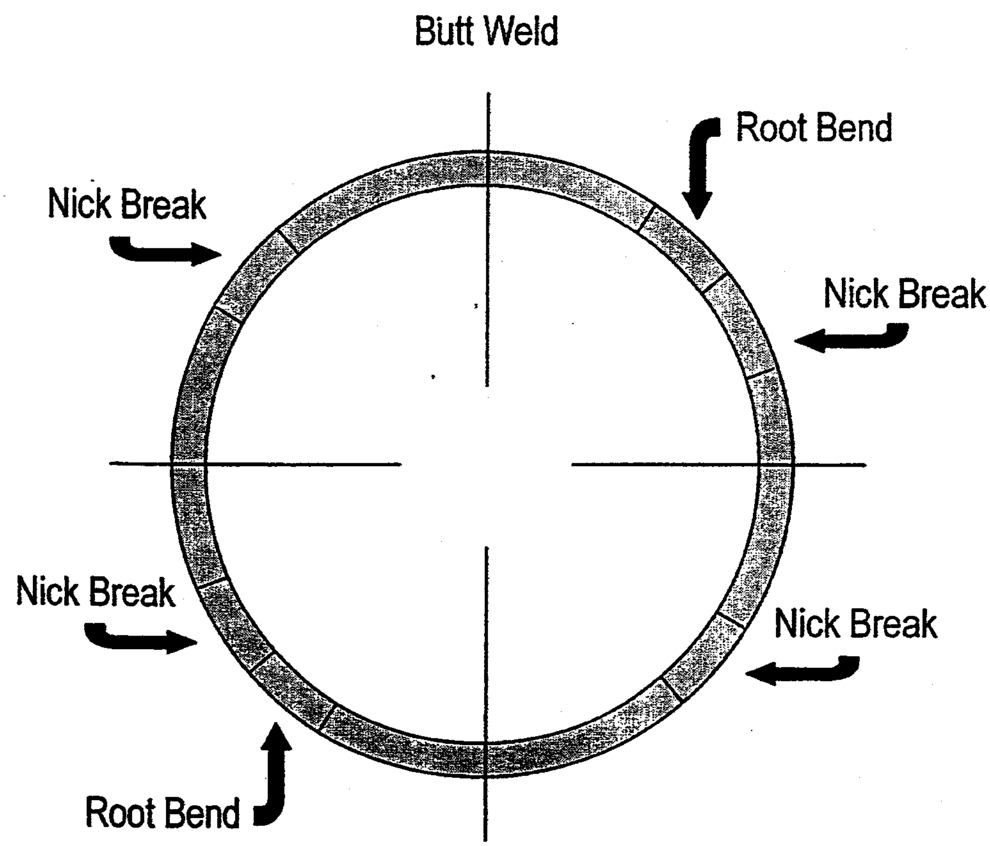
B. This may be a production weld or a sample weld.

3.4 REJECTION CRITERIA

A. Electric arc welders taking the requalification or initial test shall have the test weld found acceptable if it meets the requirements the API 1104 standard.

FIGURE 1

REQUALIFICATION TEST - ELECTRIC ARC WELDING
Biannual



PROCEDURES
QUALIFICATION TESTING / PVC

4.0 PURPOSE

This section establishes the specific requirements and procedures by which personnel will be deemed qualified to join PVC pipe, tubing and fittings by the use of PVC solvent cement.

Preliminary training shall be provided for each person attempting to qualify in joining PVC pipe.

Each person attempting to qualify should understand all of the procedures for joining PVC pipe and fittings prior to qualification testing.

4.1 SCOPE

A. Initial test

B. Requalification testing

4.2 INITIAL TEST REQUIREMENTS

A. The qualification test shall consist of:
   1. 2" PVC pipe coupling joint

B. The initial qualification shall be conducted by a **Qualified Individual**. The individual conducting the tests shall:
   1. Observe the construction of the fusion test assembly.
   2. Evaluate the fusion heating times, safety practices, and use and care of tools.
   3. Check for the double rollback bead in the butt joint. Inspect the joint for a uniform, nonporous, well-aligned bead around its entire circumference.
   4. Observe that all aspects of the procedures are adhered to during the qualification test.

C. After joints have cured undisturbed for a minimum of 4 hours, 24 whenever possible, four bands will be cut and subjected to face bend test.

4.3 REJECTION CRITERIA

A. The following constitutes the criteria that will result in disqualification of a person to make heat fusion joints with polyethylene:

PROCEDURES
QUALIFICATION TESTING / PVC

1. Any failure to perform the assembly per qualified joining procedures.
2. Failure to follow proper safety practices
3. Failure to use proper tools or the improper use of those tools
4. Any defect by visual inspection
   - Excess PVC solvent (spilling out of the fitting onto the exposed pipe or puddling)
   - Excess PVC cement (spilling out of the fitting onto the exposed pipe or puddling)
   - Pipe that has not bottomed out in the fitting or non-squared pipe ends
   - Any pipe stab that does not show visible reference mark
5. Any defect or failure of the bead test. (Breakage)

4.3 ANNUAL REQUALIFICATIONS

A. The annual re-qualification test shall consist of one 2" socket joint

PROCEDURES
REGULATOR STATION INSPECTION AND MAINTENANCE / GENERAL

1.0 PURPOSE
(192.195 & 192.739)

It is the purpose of this section to provide minimum requirements and general information on the methods and procedures for inspection and tests to ensure that valves and regulators are:

1. In good mechanical condition.
2. Set to function at the correct pressure.
3. Properly installed and protected from dirt, liquids or other adverse conditions affecting operation.

1.1 SCOPE

This section covers the following:

A. Inspection Frequency
B. Requirements

1.2 INSPECTION FREQUECY

A. City Gate Stations and District Regulator Stations facilities shall be maintained once each calendar year, not to exceed 15 months.

B. Pressure shall be monitored at a minimum of once each week. (Weekly pressure recording charts or other actual time monitoring equipment is recommended for the large stations)

C Small volume pressure reducing facilities such as customer meters with overpressure protection shall be maintained By-annually. (Pressure gauges are adequate for these type installations)

D. Special inspections shall be conducted whenever there is reason to suspect foreign materials in the gas stream or other operation problems.

E. Document all findings on appropriate forms.

F. Any abnormal operating condition shall be reported to the gas supervisor **Immediately**

1.3 REQUIREMENTS

A. Each pressure reducing station shall be designed and installed with adequate capacity and adequate overpressure protection, and to prevent a single incident from affecting both the overpressure device and the primary/district regulator.

B. Each pressure reducing station shall be inspected and maintained once each calendar year not to exceed 15 months, to include station flow and lock-up. Each calendar year, the station shall be evaluated as to adequate flow capacity and relief capacity.

C. Pressure regulator facilities that are designed to reduce pressure from high-pressure pipelines to normal distribution pressure (Other than customer meter set assemblies designed for standard delivery pressure) shall require overpressure protection.

D. Pressure reducing stations shall be designed to protect against a single failure.

E. All pressure reducing station equipment shall be inspected and operated to ensure proper operation and overpressure protection.

F. Once each calendar year, not to exceed 15 months the operator shall calculate the capacity and adequacy of and pressure relief equipment.

PROCEDURES
REGULATOR STATION / ANNUAL MAINTENANCE

2.0 PURPOSE

The purpose of this section is to establish the procedures for Operation and maintenance or pressure regulating and reducing equipment in the operators system.

2.1 REGULATORS

A. Each regulator shall be inspected. The following maintenance shall be performed:

1. Check and record inlet pressure as found.
2. Check and record flow pressure as found.
3. Verify Worker and Monitor regulator operation
4. Set flow pressure as required and document.
5. Set lock-up pressure as required.
6. Reverse Worker and Monitor regulator configuration

B. Document all findings and work performed on appropriate forms.

2.4 VALVES

A. All station valves, and the station inlet and outlet isolation valves, shall be inspected, serviced and operated. The following maintenance should be performed for each valve:

1. Inlet and outlet isolation valves: shall be maintained in accordance with **Section G-3**.
2. Station valves:
   - Operate valves. (1/8th turn)
   - Lubricate as may be applicable.

B. Document all findings and work performed on appropriate forms.

2.5 OTHER EQUIPMENT

A. Check and maintain as necessary all
1. Control piping
2. Filter / Strainer (Follow manufacturer recommendations)
3. Pilot heater(s)

4. Safety equipment including relief device if pressent
5. Recorder and/or Gauges

B. Document all findings and work performed on appropriate forms

PROCEDURES
REGULATOR STATION / FLOW AND LOCK-UP

3.0 PURPOSE

The purpose of this section is to establish procedures for safe y setting flow and lock-up pressures

3.1 SCOPE

A. Flow
B. Lock-up

3.2 REGULATOR FLOW AND LOCK-UP

A. Flow pressure is the pressure the regulator is designed to normally pass gas.

1. Check and record inlet pressure as found
2. Check and record flow pressure as found
3. Set flow pressure as required and document

B. Lock-up is the pressure at which the regulator is designed to stop passing gas.

1. Lock-up is to be checked, using a test gauge downstream of the device to be tested, by closing the outlet valve and watching the test gauge.
2. Set lock-up pressure as required.
3. The technician must verify that the device stops feeding

C. Both Worker and Monitor regulators must each be tested.

D. Internal inspection is required when during inspection, any regulator or monitor set fails to lock-up, or the monitor fails to assume control.

1. Repair or replace any damaged or defective equipment
2. All maintenance and parts replacement will be performed in accordance with the manufacturer's procedures.

E. Ensure that the "as left" pressure does not exceed the MAOP of the system.

F. Document all findings and work performed on appropriate forms.

PROCEDURES
PROPANE / GENERAL

1.0 PURPOSE

It is the purpose of this section to provide minimum requirements and general information on the methods and procedures specific to propane gas which differ from those natural gas procedures already covered in Sections A through O of this manual.

1.1 SCOPE

A. Odorant Testing
B. Leakage Survey
C. Regulator Conversion

1.2 GENERAL

For the most part, the procedures related to the natural gas system are the same as those procedures related to the propane system. Where differences do occur, they will be detailed in the following subparts:

1.3 ODORIZATION

The propane gas supplied to the Operator's propane distribution system is pre-odorized.

In testing the propane system for proper odorization levels with the Heath Odorator, immediately report any reading of .42, 1/5th LEL, or greater which indicates low propane odorant levels, to the gas supervisor. **Refer to Section H-6**

For Propane, the supplier shall be notified to initiate corrective action should low odorant levels be indicated.

1.4 LEAKAGE

The procedures to determine leak spread, to classify leakage, marking leaks, centering leaks and purging bar holes remains the same for either natural gas or propane. **Refer to Section J**

There are however differences in the procedures to perform annual business district and in the 20% leakage surveys.

Propane system leakage surveys may be conducted using either of two approved methods.

Pressure Test: Isolate all of the propane customer meter(s) from their source of supply

- Turn off all service riser stop cocks
- Soap test stop cock to ensure no leakage
- If leakage at the stop cock is present, fix or replace the stopcock and re-soap test
- When system is isolated, slowly raise the propane system AOP, 10 psig, to 15 psig by means of feeding through the propane regulators located immediately downstream of the propane tank.
- Monitor system gauge(s) for a period of two (2) hours to ensure no leakage
- If indication of system leakage is present, any loss of pressure during the test duration, proceed with further leakage survey to locate, grade, center leakage
- Repair or monitor leakage as necessary
- When survey is complete, turn on and relight each propane customer
- Reset pressure regulators at propane tank and allow for pressure to return to normal AOP
- Document all actions and findings

Bar Hole Survey: Survey may be conducted using either an FI or CGI. When using an FI unit, consideration shall be made to weather, wind and other sampling conditions. **Refer to Section J-2**

- Place bar holes at a depth of approximately 18" along the propane system mains and service lines
- Bar hole placement shall be at maximum intervals of 20 Ft on alternating sides of the propane gas pipeline
- Conduct leakage survey by means of walking the entire system length including

service lines with an FI unit, or inserting the CGI probe into each bar hole to ensure no leakage is present

- If indication(s) of leakage is present, proceed to grade and center leakage
- Repair or monitor leakage as necessary
- Document all actions and findings

Leakage grading is the same for propane as for natural gas. Grade I leaks require immediate and continual action until corrected.

PROCEDURES
PROPANE / REGULATOR CONVERSION

2.0 PURPOSE

The purpose of this section is to establish minimum requirements for the safe conversion of propane regulators to operate with natural gas.

2.1 GENERAL

When changing an existing propane customer to natural gas, the potential exists that the existing propane regulator may be converted to operate with natural gas. Check with the manufacturer for specifications.

2.2 FISHER 522 AND 552 REGULATOR

A. Fisher 522 and Fisher 552 service regulator may be converted from propane to natural gas.

B. Ensure that the existing propane regulator is operating properly. Perform a leak test using leak detection soap to verify leakage if any.

C. Remove the adjustment spring cap, then remove, and replace the propane spring with the appropriate natural gas spring (yellow).

D. Perform a flow and lock up procedure, and when set correctly, replace the adjustment spring cap.

E. Should proper flow and lock up not be achieved for the regulator, remove, replace, and destroy the old regulator. **Refer to Section F-3**

PROCEDURES
PROPANE / ODORANT

3.0 PURPOSE

It is the purpose of this section to provide minimum requirements for monitoring and verifying the adequate levels of odorant are present to protect the general public.

3.1 ODORIZATION

The propane gas supplied to the Operator's propane distribution system is pre-odorized.

In testing the propane system for proper odorization levels with the Heath Odorator, immediately report any reading of .42, 1/5th LEL, or greater which indicates low propane odorant levels, to the gas supervisor. **Refer to Section H-6**

For Propane, the supplier shall be notified to initiate corrective action should low odorant levels be indicated.

PROCEDURES
PROPANE / LEAKAGE

4.0 PURPOSE

It is the purpose of this section to provide procedure for performing leakage surveys and leakage investigation involving propane distribution systems.

4.1 SCOPE

A. The leakage procedures (**Refer to Section J of this Manual**) to determine leak spread, to classify leakage, marking leaks, centering leaks and purging bar holes remains virtually the same for propane as for natural gas.
B. The equipment used to detect propane gas leakage differs from that which is used for natural gas in that the CGI must be calibrated specifically for propane. Damage to equipment calibrated for natural gas may occur when utilizing that equipment for propane gas.
C. Leakage Procedures
D. Reporting and Documentation

4.2 LEAKAGE

Propane distribution system leakage survey may be conducted using either of two approved methods.

A. Pressure Test:
1. Turn off all service riser stop cocks isolating the customer meter(s) from their source of supply
2. Soap test stop cock to ensure no leakage
3. If leakage at the stop cock is present, fix or replace the stopcock and re-soap test
4. Isolate the section of pipe to be leak checked
5. When system is isolated, slowly raise the propane system operating pressure approximately 10 psig, by means of feeding through the propane regulators located immediately downstream of the propane supply tank
6. Monitor system gauge(s) for a period of two (2) hours to ensure no leakage
7. If indication of system leakage is present (Any loss of pressure during the test duration) proceed with further leakage survey to locate, grade, center leakage
8. Repair or monitor leakage as necessary
9. When survey is complete, turn on and relight each propane customer
10. Reset pressure regulators at propane tank and allow for pressure to return to

normal operating pressure.

11. Document all actions and findings on appropriate forms

B. Bar Hole Survey: Conducted leakage survey using a FI Unit or a CGI unit properly calibrated for propane gas. When conducting survey, consideration shall be made to weather, wind and other sampling conditions the same as for natural gas. **(Refer to Section J)**

The survey may be conducted by using a combination of selected bar holes, surface sampling and available opening tests (curb boxes, manholes, catch basins, etc.) using a portable flame ionization instrument or CGI. Surface sampling is conducted continuously between bar holes over the soil, joints in paving and at curb lines.

1. Place bar holes at a minimum depth of 18" but as deep as practical to be below the propane piping system main and service lines, except when the main is less than 18" deep, but may need to be the depth of the pipe depending on the soil type and condition as well as the condition of the pipe, operating pressure and type of instrument being used.
2. Bar hole placement shall be at maximum intervals of 20 Ft on alternating sides of the propane pipeline
3. Conduct leakage survey by means of walking the entire system length including service lines with an FI unit, or inserting the CGI probe into each bar hole to ensure no leakage is present
4. The sampling pattern includes tests at locations including
   a. Threaded or mechanical joints
   b. At building wall
   c. At the service riser or service line entrance
   d. All available openings adjacent to the facility being surveyed
5. If indication(s) of leakage is present, proceed to grade and center leakage using a CGI properly calibrated for propane
6. Repair or monitor leakage as necessary
7. Document all actions and findings on appropriate forms

C Leakage grading is the same for propane as for natural gas. Grade I leaks require immediate and continual action until corrected. **(Refer to Section J-5)**

NOTE: Because liquefied petroleum gas is heavier than air and will collect in low areas instead of dissipating, few leaks can safely be classified as Grade 3.

4.3 LEAKAGE SURVEY REPORTING and DOCUMENTATION

A. Any leak indication detected, which in the judgment of the field technician requires immediate attention (Grade 1), will be reported by telephone to the designated official when detected.

B. Daily leak reports indicating the leak locations detected each day will be prepared for each leak location investigated by the field technician.

C. Maps indicating daily survey coverage shall be prepared and these maps shall be signed and dated as a permanent record of the survey.

D. Where maps are not available, lists shall be prepared detailing the streets and/or specific lines surveyed and these lists shall be signed and dated as a permanent record of the survey.